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# Editorial

MOST interesting news of the month is in the possibility of energising the upper atmosphere by means of electrical radiation from high powered transmitters, thus causing the ionised particles to glow, emit light, and illuminate the area beneath.

Not only has the scheme been mooted as practicable overseas, but Professor Bailey of Sydney University reveals that in 1934-6 he evolved a new mathematical theory of "gyro-interaction of radio waves," which figured in American and European journals.

In 1937 in England, he was given the use of a number of European broadcasting stations for two weeks during the night. His experiments, he claims, repeated with higher power, would illuminate the upper atmosphere.

Previously in 1936 he had taken out patents on the idea, but could not afford to pay for world rights.

To use his own words, the scheme in 1939 was for "generating a visible glow discharge near the lower part of the E layer in the atmosphere, by means of a radio station radiating an appropriate circularly polarised vertical beam of gyro waves at the rate of 500 kilowatts from an aerial system constituting 800 horizontal half-wave aerials lying in a plane situated ¼ of a gyro-wave above the ground.

"This aerial system would have approximately the appearance of a square network nearly two kilometres long, with mesh of 100 metres, and an elevation of 50 metres."

Bailey's plan eventually was set out to provide an area of about 10,000 square kilometres with roadway illumination, using power of a million kilowatts.

The biggest stations in the world then were Moscow and Cincinnati, but now he says he has evolved other means of stepping up power, and could do the experiments here, if he had time and money.

It appears, therefore, that yet another Australian scientist has been able to demonstrate his knowledge and imagination, but has been prevented from exploiting either by lack of finance and facilities. This story has been told many times—maybe it is inevitable at present, but it certainly is more than regrettable. Our top line scientific brains may be few in number, but there is little doubt of their quality.

The particular line of research leading to modifying the behavior of the ionosphere has enormous possibilities. Already it has been suggested that the protection it now affords against cosmic ray radiation from the sun may be artificially removed, with terrifying possibilities for that section of the earth exposed to such rays—possibilities which make the effects of an atom-bomb mere child's play.

The project is vast, and years may well elapse before the extent of what may be done is to be realised. But it is one more reminder that we are in an age in which the scientist has learned so much in the laboratory that he is now turning to the universe in order to find scope for what he can do.

John Moyle

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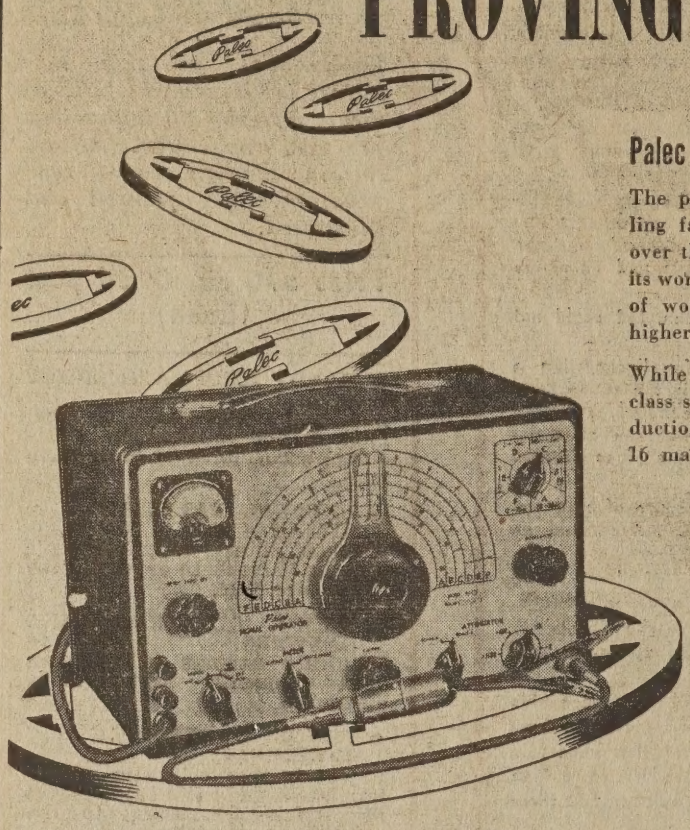
EDITOR: John Moyle, M.I.R.E. (VK2JU). TECHNICAL EDITOR: NEVILLE WILLIAMS, A.M.I.R.E. (VK2XV).

# PROVING THEIR WORTH




## Palec Signal Generator Model S.G.1.

The performance of this instrument under gruelling factory conditions has been closely watched over the last 12 months. It has more than proved its worth and compares favourably with instruments of world-wide reputation selling at considerably higher prices.

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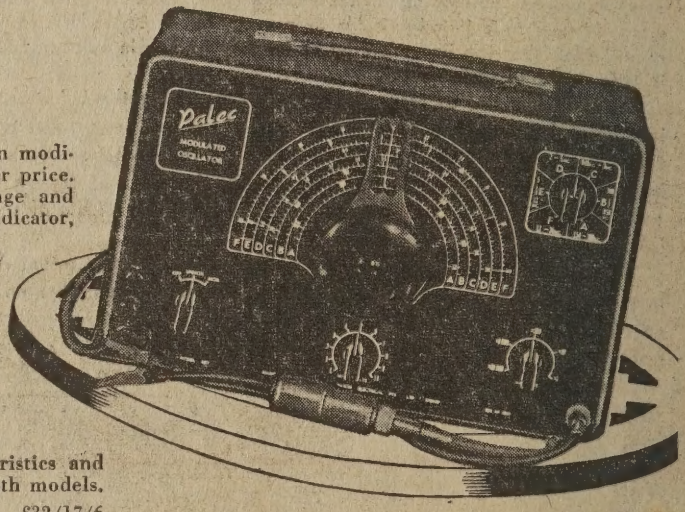
You are invited to write or call for full specifications and details.

Price — Model S.G.1 ..... £54

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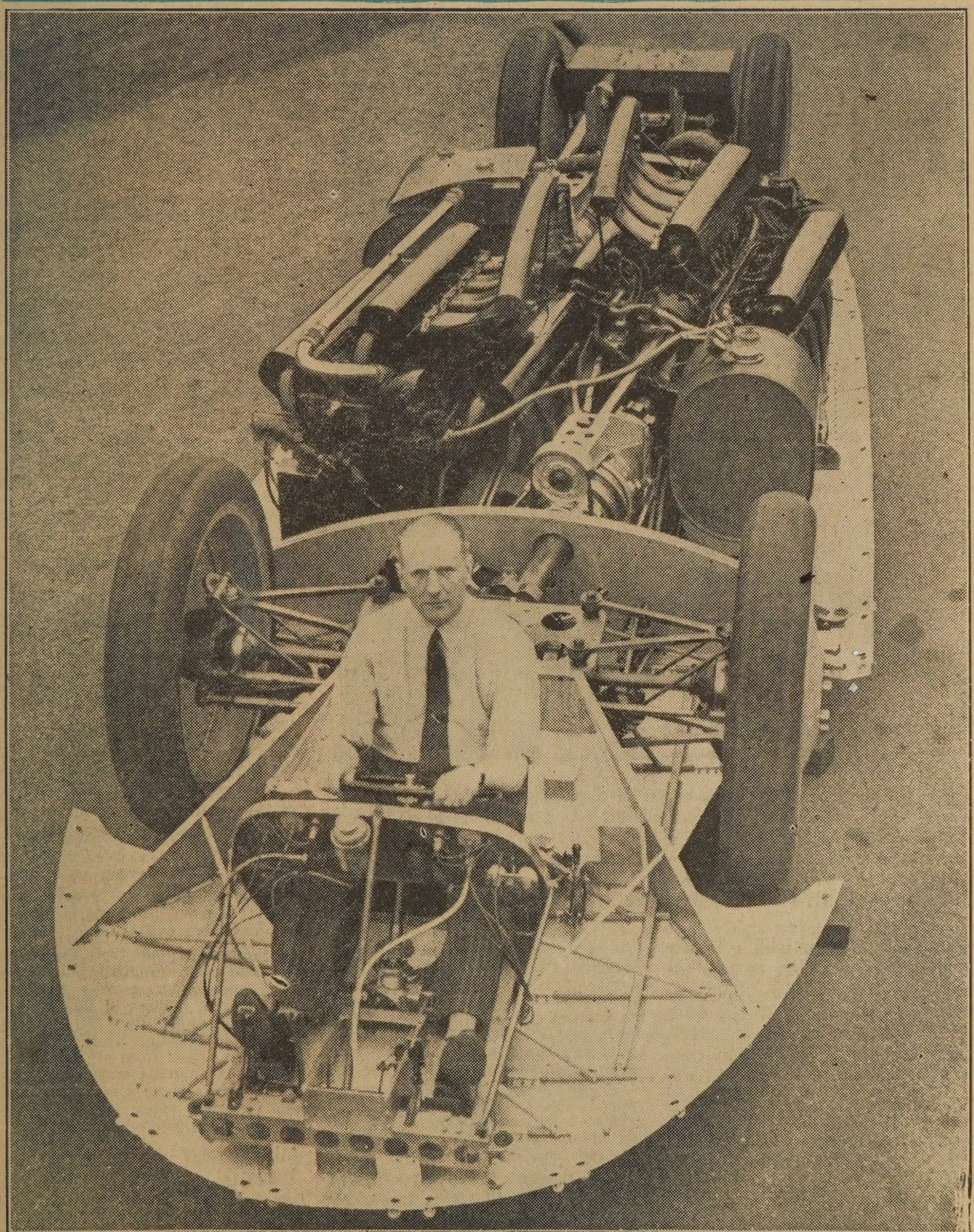
# FASTEST THING ON FOUR WHEELS



This splendid picture shows world land speed record holder John Cobb at the wheel of his Railton special, minus the streamlined body. It has two Napier 12 cylinder, 1250 hp engines, is 28ft. long and 8ft. wide. It wears out a complete set of tyres with each run. Cobb's record stands at 394 miles per hour.

# NEW STANDARDS IN GRAMO. RECORDS

**The reproduction of sound by means of disc records is approaching a revolution. For many years, the world's sound engineers have been experimenting with new ideas in recording and reproduction, the fruits of which are now coming to light. New records, new pickups and speakers, and a new fidelity standard are on the way. They allow a realism which has lifted the disc records into an entirely new class.**

THE last big improvement in disc recordings took place early in the 1930's. Electrical methods took over from the early acoustical technique, in which horn loaded diaphrams picked up the recording directly from the disc. This was the method originally used by Edison and others, and brought to its highest level with the re-entrant horn.

There were many disadvantages of the acoustic system. Without the use of large and expensive horns, a wide frequency range was impossible. Even so, mechanical limitations of the diaphram itself seriously limited dynamic and frequency range. The direct method of pick-up from the record virtually ruled out control of volume.

Many of these disadvantages were overcome with electrical methods. Moving coil speakers extended bass reproduction and recording far below the limit of the acoustic horns. The new speakers were better also in the upper registers. Volume control became a simple matter—the amount of amplification could be varied at will. It really seemed as though the ultimate had been reached, and gramophone enthusiasts settled down to many years of splendid results.

But, as results became better and better, so did the standards demanded by record consumers. Research improved record surfaces, experience gave added vitality and life to all types of music, from vocal to massed orchestras. Little by little, the "needle scratch" or hiss level was reduced. In step with these improvements came better pickups, amplifiers, and loudspeakers. These allowed a dynamic range, or ratio between loud and soft passages, very much better than with the first electrical records. A frequency range of from about 50 - 8000 cycles was achieved with some of the star releases.

## NEW PICKUPS

Laboratory experiments, however, had already shown recording engineers that they could do much better than this. Even before the war, special recordings reproduced through special equipment were pointing the way. New, lightweight pickups with permanent sapphire type "needles" demonstrated what was possible. How to capitalise on these things presented the greatest problem.

Round about the end of the last war, the Decca company dropped something of a bombshell by announcing their Full Frequency Range Recording, abbreviated to f.f.r.r. The colossal range of between 30 and 14,000 cycles was claimed. It would only be obtained, of course, by using the very best equipment, including one of the newly-designed pickups, of which quite a crop had begun to make their appearance.

THE OBOE—you can easily pick him out on the new records—most of the oboe's tone consists of harmonics, often lost in old-style reproduction.

The other major recording companies were equally advanced in their technique. But they deemed it wise to go slowly, until enough records had been released, using all or part of the new range, to make publicity worth while. Every now and then, we found records which were obviously far ahead of the general run. Of late months, these have become more and more frequent.

At the present time, then, the record companies are gradually including better and better records in their lists. A large number of English and American manufacturers are busy designing new pickups, all of extremely light weight, free from serious resonances in the audible range, and capable of reproducing substantially the same recording range as characterise the records themselves.

## LOW OUTPUT

Generally speaking, these pickups have a much lower output than the popular crystal or standard magnetic types. They require higher amplification at the reproducing end—generally one more high-gain stage. Their frequency curve is such that some form of bass compensation, or boosting, must be included to give best results. They cannot as a rule be operated in

# WILL REVOLUTIONIZE REPRODUCTION

by John Moyle

place of the average pickup without a pre-amplifier.

Older records will not always show up better with them, as high surface noise, distortion and pressing defects are highlighted often with uncomfortable results. It will probably be necessary to use some form of tone control to accommodate them.

## REALISM

On the other hand, the newer recordings will present a realism which is often breathtaking. The lower notes are infinitely cleaner and free from resonances so often mistaken for real bass. In the upper registers, cymbals, triangles, oboes, etc, stand out with all their harmonics and overtones, enabling the listener to pick them unmistakably. The diction of singers assumes an uncanny "presence," the edge of a muted trumpet stabs the air with all its characteristic metallic shiver.

At the moment, the loudspeaker seems to be the weak link in the chain. Present-day speakers of the 12-inch variety, and these are really a "must" in a high-grade instrument, are good, but not nearly good enough for the very best. It is only a matter of time, however, before these become available—how late or soon it is impossible to say.

The availability of the new instruments is something which will probably be gradual. It is safe to say, however, that makers of high-class radiograms are already planning new instruments, using new type pickups, and, we hope, better speakers. Eventually, the present practice of hitching a pickup to a radio set will go by the board. The audio section will be specially built to include the right degree of amplification and compensation, a process which might well improve results on radio as well, although there are at present other factors inherent in the radio tuner which will limit results to something less than is possible from records.

If you think our use of the term "revolution" might be a little too fulsome, read this report recently received from an American correspondent, who attended a demonstration of the new recordings played through a super reproducing system.

## NOVEL CONTEST

"A new radio-phonograph "took on" a full symphony orchestra here tonight and in a David-and-Goliath exhibition which amazed 40-odd critics and hundreds of musical personalities assembled at Nathaniel Hawthorne's old home, it won the contest hands down. The phonograph was tonally more pure and showed higher fidelity than the orchestra.

The stunt may have been Press agentry at its best but there was no doubt as to which "instrument" had the more substantial values in the first such comparison ever attempted.

In its meteoric 30-year American career, musical reproduction on records has reached such a peak of fidelity that Leonard Bernstein recently had to conduct a recording orchestra in stockinged feet because his squeaky shoes were spoiling record after record.

## RECORDS POPULAR

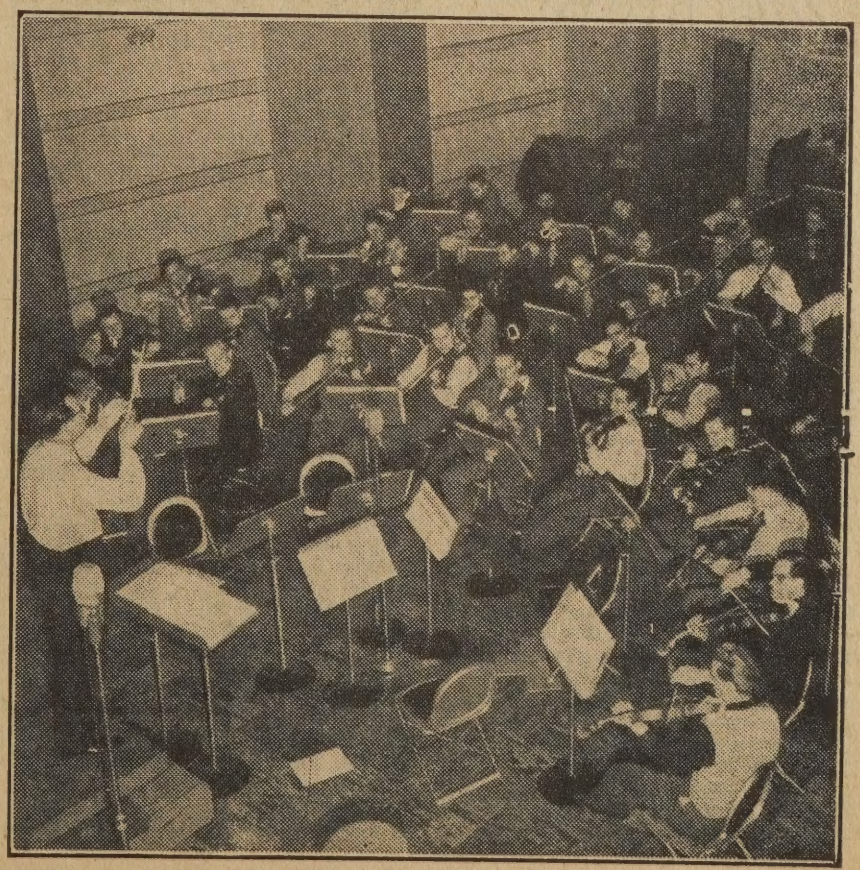
Phonographs, however, have rarely matched the present-day qualities of the discs played on them — despite multiple speakers and other costly efforts to achieve tonal value.

This despite the fact that 200 recording companies in the United States are now producing some 300,000,000 records a year. About 75,000,000 of these are classical recordings which demand great fidelity. And the public is asking for more classics, with the estimated output for the coming year set at 100,000,000.

What's more, Gustav Mahler's scholarly fourth symphony sold more than 15,000 copies last year, and Bach's esoteric Goldberg variations for harpsichord, which sold maybe 50 copies in the United States in 1933, sold more than 29,000 albums when recorded again recently by the same performer, Wanda Landowska.

## BETTER "PHONOGRAPHS"

This trend toward better music called for a new superlative phonograph which could equal the fidelity of records. Modern discs pick up without distortion the whole range of sounds audible to the human ear between 30 and 15,000 cycles, but the best phonograph can reproduce correctly only notes between 80 and 4000 cycles; all the lower register of a piano, for example, is lost, and more than two-thirds of the entire range of a piccolo are lost.

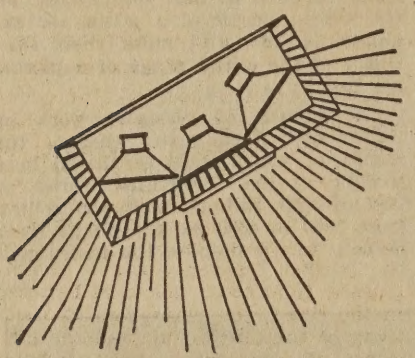
Six months of intensive work by RCA-Victor technicians ensued, the results of which were premiered here tonight in the "Berkshire" series of custom-built radiophonographs selling from 1800 to 4000 dollars—that's right —each. In my opinion the instrument

LOST THE DECISION!—An American experiment of records v. original resulted in a vote for the recording, mainly due to carefully controlled conditions and wide range reproduction.

is not eight times better than 500 dollar models now on the market—for the average listener. But for anyone with that much money to spend, this really is something.

In the test here, the Boston Symphony Orchestra, conducted by Serge Koussevitzky, alternated with a phonograph playing Beethoven's Egmont Overture and it was possible to distinguish between them only because the orchestra sounded worse. This may be because the recording was made under ideal conditions, which is rarely the case in a concert hall.

An RCA engineer assured me as his personal opinion that the day was not far off when mass production may bring the cost of these instruments down as low as 200 dollars.

My reaction, it must be stressed, is only a personal opinion and the value of any opinion is exemplified by the story of a recent concert for which four Stradivarius violins had been assembled. Critics on the following day were unanimous in their praise of the unique tone quality of such a combination. They hailed the "true Strad tone," blissfully unaware that radio technicians had required a last-minute substitution of ordinary garden-variety violins.

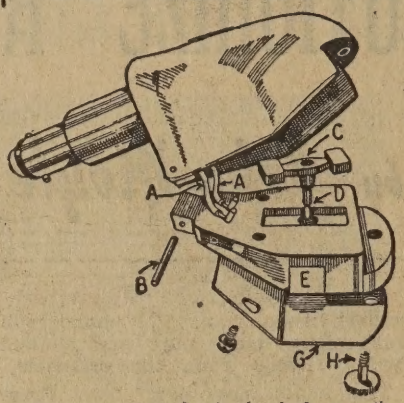


Three speakers provide wide-angle coverage.

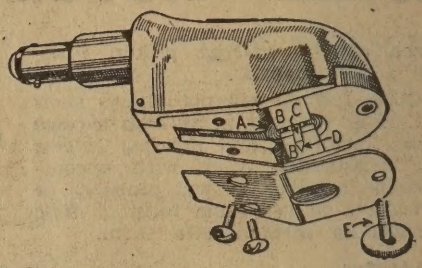
## VACUUM LEAKS

VACUUM leaks may now be detected by a new ionisation gauge tube which permits one gas to pass while holding back all others, according to a release issued last month by RCA. The new tube, RCA1945, is sensitive to hydrogen only. It features a palladium plate which, when hot, is porous to hydrogen only. It features a palladium barrier to all other gases and vapors. In operation, the tube is connected into a vacuum enclosure or system to be checked for leaks. A tiny jet of hydrogen is then played over the outside areas of the suspected system. Any leaks will suck in the hydrogen which then runs down to the tube, passing through the palladium plate and causing an increase in the ion current inside the tube. This increase in current is amplified and indicated on a microammeter. Tiny leaks, so small that molecules of air barely pass through them, can be detected by the tube, which is sensitive enough to detect an increase in hydrogen pressure of less than 0.0000001mm. of mercury.

## DETAILS OF NEW TYPE PICKUP




Pick-up exploded. A—leads from coil; B—hinge pin; C—rubber mount for armature; D—the armature; E—magnet; G—cover plate.




Bottom view. A—coil; B—magnets; C—armature; D—sapphire; E—milled screw.

By courtesy of "Radiocraft," the following details of Decca's new pickup and gramophone, the "Deccola," are given below:—

Decca's first line of attack was to produce a pickup with no resonance within the audio range.

The body of the pickup is 1 3-8 inch in length, 1 1-8 inch in diameter, and 5-8 inch in depth. When balanced on the tone arm its weight is six-tenths of an ounce. As will be seen, it is of the moving iron type and contains many interesting features.

The rubber mount of the armature allows free lateral movement, but enforces complete rigidity fore and aft. The magnets are so situated that when a record is being played they are little more than 1-16th of an inch above its surface. The maximum flux change through the armature is thus obtained. The pivot of the armature, being near the top of the pickup, is well away from the area of flux change.

The playing tip of the armature is of sapphire; after 1000 records the pickup is opened by undoing the milled screw, the armature and its mount are removed and thrown away, and replaced with a new armature complete with mount.

This pickup has no resonances below 14,000 cycles and surface noise is very slight when it is in use.

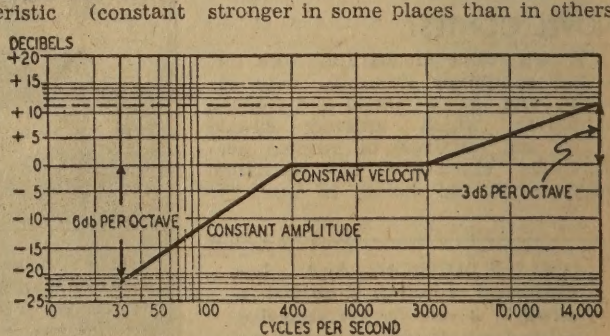
The recording characteristic of ffrr records is shown below. It will be seen that from 400 to 30 cycles at constant amplitude there is a fall of 6 db per octave. After the change-over at 400 cycles the characteristic (constant velocity) is level to 3000 cycles. From that point upwards the rise is 3 db per octave. This rise is deliberately made to begin at 3000 cycles because it is realised that the records will often be played on ordinary radio - phonographs, almost all of which have loudspeakers peaking at or about this point and then showing a falling characteristic.

It is found in practice that a rise of 3 db per octave is the most that can be used profitably; if the rise is steeper the pickup needle is liable not to track properly at high frequencies owing to the sharpness of the curves of the grooves.

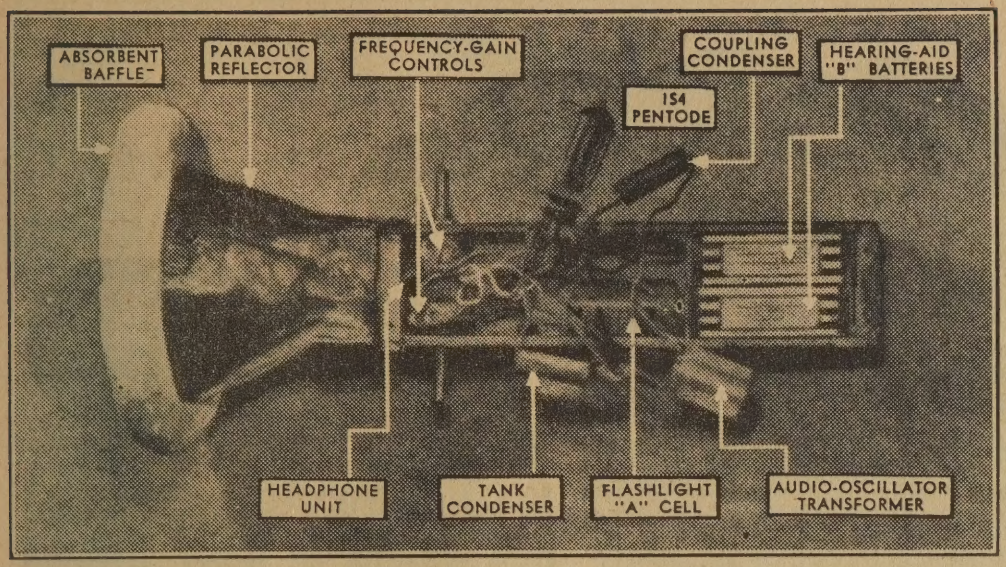
### HIGH QUALITY

Though these records can be used with very good results on ordinary radio-phonographs, only a specially designed reproducing instrument can bring out their full beauty. Radio and radio-phonograph designers are usually well satisfied if the harmonic distortion of the reproduction does not exceed 5 per cent. This undoubtedly fulfils most requirements, so long as the a.f. response does not extend much beyond 5000 cycles. But when an amplifier is capable of a response up to 14,000 cycles, such a percentage of harmonic distortion would cause unpleasant effects owing to the production of parasitic difference and summation notes, whose number increases as the frequency range is widened.

The Deccola, as the reproducer is called, contains four stages of triode Class-A amplification. Careful design has reduced the harmonic content to 0.5 per cent. Three 12-inch loudspeakers are used, arranged on the convex arc of a circle so that the sound is evenly distributed and there is no beaming of the high audio frequencies. One can walk about the room without finding the high notes stronger in some places than in others.




The recording characteristic curve for ffrr recordings.




Using "flashlight" type construction the device fits into a case of similar shape. This cut-away diagram shows how simple it all is, and how few components are required. Miniature batteries supply the power for the valve.

# ECHO FLASHLIGHT AIDS THE BLIND

**Some little time ago we wrote an article in which, among many other things, were mentioned various fields of application for radar principles. It is interesting, therefore, to read of the device detailed here, which depends on the principle of reflected sound to warn blind people of obstacles in their path, and which is similar to one we had in mind.**

STRICTLY speaking, this is not a radar device, in that it does not make use of pulse technique. Its radiations are rather of a steady nature, and the similarity with radar is limited to the use of reflected waves, which are generated from the device itself, and heard by the operator.

Furthermore, these are not radio waves, but sound waves, of a fairly high frequency. The possibility of using sound waves was mentioned in our article, not only because they lend themselves somewhat better to apparatus to be operated by the average person, but because they avoid complexities in the circuit which would prevent the device from being as simple as shown here.

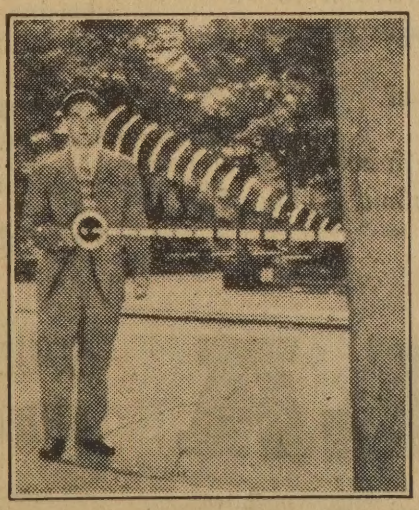
There are two units required for any system of radiation and detection of waves—one being the transmitter, and the other the receiver. The human body has no organs which, in their natural state, can detect radio waves, but includes an efficient pair of ears which can hear sounds from about 30 to 14,000 cycles.

By using sound waves, the designers of this equipment do not need to provide a receiver, and their problems end with providing a suitable transmitter.

The transmitter is really a small audio oscillator of conventional design, built, as shown in the illustrations, into a case something like a large flashlight.

In the handle or tubular, portion of the case, the batteries, single valve, oscillator transformer, and other small parts, are accommodated. The circuit is not available, but, from a study of the components used, it is apparent that one very similar to that used in some small audio oscillators recently described in "Radio and Hobbies" is employed.

The frequency of oscillation is determined by the electrical characteristics of the circuit components, and can be varied over limits according to their values. No doubt the originators carried out a number of experiments to determine which part of the audio spectrum is most suitable. The factors to be considered here would be the relative strength of oscillation from which good reflections would be expected, the psychological reaction to such frequencies, the ease with which the selected frequency can be distinguished from other noises to be heard in the street, the natural audio selectivity of the human ear, and the efficiency of the parabola which radiates the sound in a narrow beam.



Instead of a light beam, a sound beam is radiated by the transmitter and reflector. The sound waves are reflected from the tree in this picture, and are heard by the user or anyone else nearby.

All these factors would indicate a frequency fairly high in the audio spectrum.

The details so far released state that when there is no nearby object to reflect the sound, it is barely audible to the user as a low, steady whine. As an object is approached, this changes into a louder, warning screech. This statement indicates the possibility of a change in pitch as the object is approached. On the other hand, there seems to be no reason why this effect should be necessary to the successful operation of the device, although, from a psychological point of view, it would probably result in more definite warning, and allow better estimation of the object's relative proximity.

The sound generated by the oscillator is made audible by the use of a small unit, similar to a headphone, the output of which is projected from the centre of the parabola. An absorbent baffle is mounted round the rim of the parabola to prevent the sound from travelling directly to the user's ears, thus ensuring the greatest possible change in sound intensity as the reflected waves bounce back from the obstruction.

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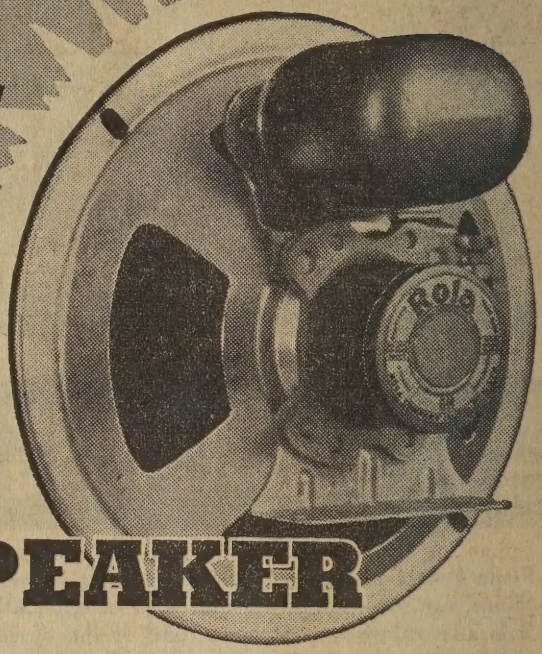


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★ Permanent magnet of Anisotropic Alnico.

★ Permacentric construction to ensure perfect diaphragm alignment.

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★ Isocore transformer immune from electrolysis, the common enemy of other transformers.

★ Bright cadmium plated cone housing.

★ Scientifically designed to give pleasing reproduction from sets with a limited baffle area.

★ Every speaker covered by the Rola Warranty.

★ Available through trade houses.

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# ROLA

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GEO. BROWN & CO. PTY. LTD
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# Technical Review

**A new and entirely mechanical process for producing radio receivers at a rate of one every 20 seconds has been developed and put into use by John Sargrove Ltd., at Walton-on-Thames, near London, England.**

THE new process known as ECME (Electronic Circuit Making Equipment) differs in many ways from systems using printed, deposited, or sprayed conductors.

The whole process is mechanical. One operator feeds bakelite blanks to the input end of the 70ft. long machine, and a second inspects the finished panels as they emerge.

Every stage of the manufacture is electronically controlled; each part of the machine starts automatically when work comes in on a conveyor and stops automatically if it has nothing to work on.

The basis of the ECME system is that an entire circuit is built on a preformed bakelite blank, which serves as the panel, and as the dielectric of capacitors, the formers of coils and the insulation between conducting paths.

Fig. 2a shows a typical ebonite blank, with depression of various shapes and sizes moulded into it. The straight grooves eventually become the conducting paths which take the place of wiring; a large spiral becomes a coil; the circular depressions, plates of fixed capitors; the rectangular depressions, the fixed plates of compression-type variable capacitors.

When depressions are moulded opposite each other on both sides of the plate, as at (B) in Figs. 3 and 4, a thin web of bakelite is left between them.

The connectors are made to cross by being placed on different sides of the panel. The connection from the inner end of the coil is brought out on the opposite side of the panel (C) and (D) in Fig. 3. The connection is made with a metal eyelet passed through the panel and clinched.

Eyelets and contacts of rotary switches (E) in Fig. 3, and tube sockets (F) are inserted mechanically. Resistors G1, G2, G3, G4 in Fig. 3 are made by spraying graphite into grooves of suitable size and shape. Low-wattage resistors of high value occupy narrow zigzag grooves. Wide grooves are used for high-wattage resistors. In practice resistors from 1 ohm to 10 megohms are readily obtained.

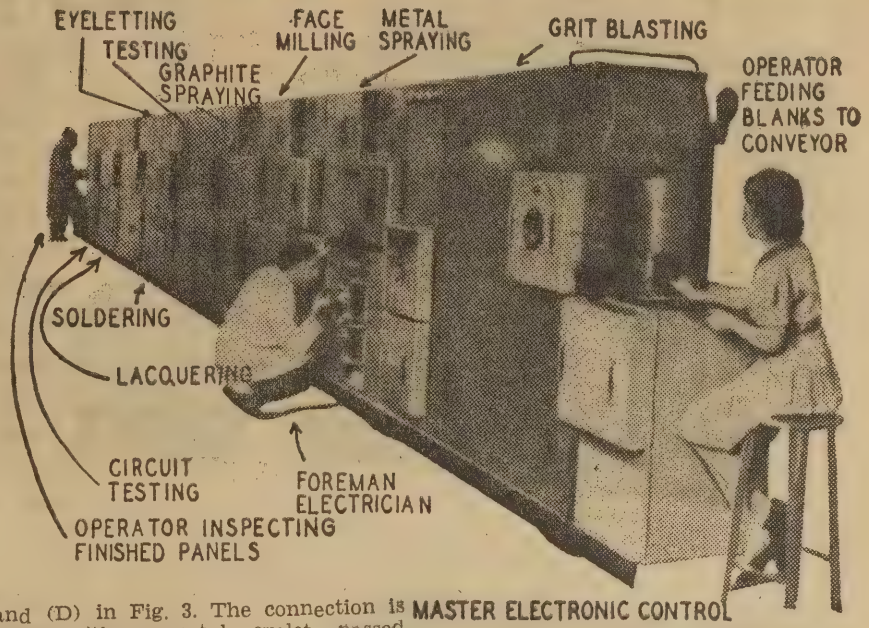
The small portion of a panel in Fig. 3 contains resistors, capacitors, and inductor, a rotary switch, and a tube socket. By the ECME process each of these components is "grown" simultaneously and automatically on the panel. The only manual operation is inserting the switch.

The machine used in the process is built of a number of self-contained sections.

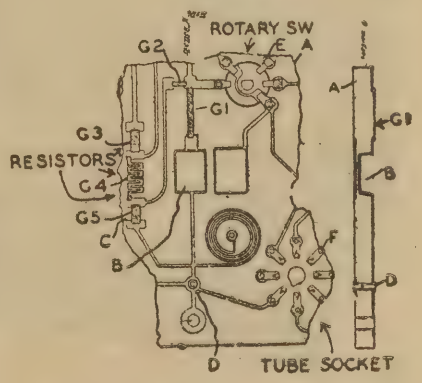
The blanks of Fig 2a are fed by the input operator to a conveyor belt. This delivers them to the grit-blasting compartment, which removes the outer skin of bakelite,

A second conveyor takes them into the metal sprayer, where they are under fire from twin batteries of wire-fed metal-spraying pistols, one battery dealing with each side. The entire surface of both sides is covered with a thin film of deposited zinc (Fig. 2b).

If the panel contains grooves for resistors, these will have been masked automatically during the metal-spraying process. Face-milling takes place in the next section. This operation




The 70-foot electronic circuit making equipment is automatic; it requires only two operators.




Figs. 3, 4.—Plan and section of part of panel.

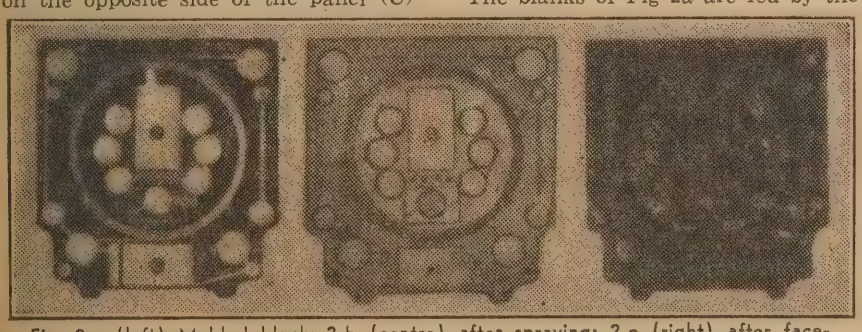
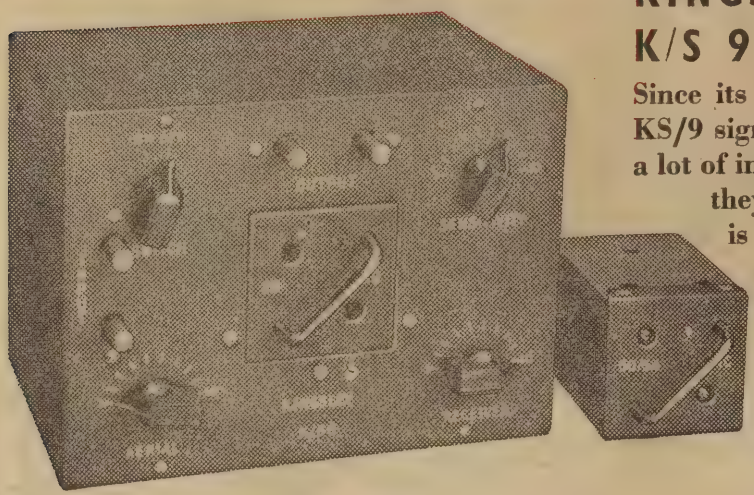


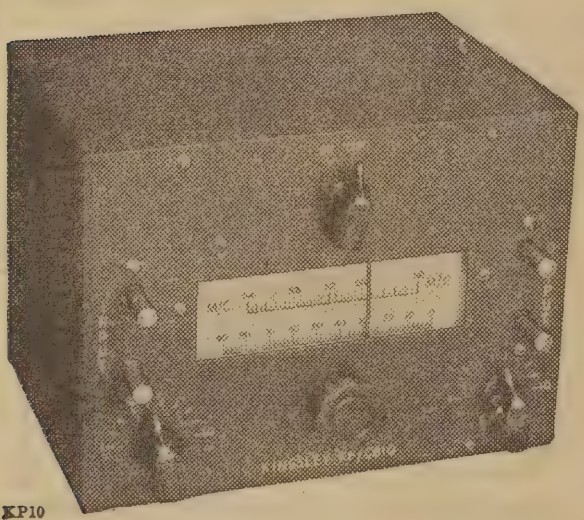
Fig. 2-a (left) Molded blank; 2-b (centre) after spraying; 2-c (right) after face-milling.

# These Kingsley Products are making Radio History!



## KINGSLEY
## K/S 9'er SIGNAL BOOSTER

**Since its introduction a few weeks ago, the KS/9 signal-strengthening unit has attracted a lot of interest. Kingsley engineers thought they had something pretty good but it is even better than they thought—and that is something to take notice of. Kingsley's new production programme is a busy one and leaves room only for the best and most useful products—so, for the very best in radio equipment—keep your eyes on Kingsley.**



KP10

## KINGSLEY
## SHORT WAVE CONVERTER

**This unit in its complete form serves as a medium to increase signals from amateurs transmitting on the 50/54 M.C. Band (6 Metres).**

**Lined and adjusted and ready for immediate use.**

***Complete installation and circuit details of both units are obtainable on application.***

KINGSLEY QUALITY RADIO PRODUCTS

# KINGSLEY RADIO

KINGSLEY RADIO PTY. LTD.

380 St. Kilda Road, Melbourne, Victoria . Phones: MX 1159, MX 3653

removes all of the deposited metal except that lying in the grooves and depressions, and the panel now has the appearance seen in Fig. 2c.

In the next operation, a set of automatically operated masks covers all of the panel except the resistor grooves during the graphite-spraying process. These masks are mounted on discs, whose rotation is electronically controlled so that a clean mask is always provided.

Tests are made automatically in the next section, and faulty panels are rejected. Eyeletting is done in the following stage; this includes the insertion of switch and tube socket contacts. ECME sets have no joints depending entirely on solder. But solder is used to assure good connections at the few points where eyelets or other through-panel contacts are clinched. The process is entirely automtaic.

The final step in construction for this type of machine is the lacquer-spraying of the panel, which covers the entire circuits with a protective layer. If tropicalisation is required, this is easily and effectively accomplished by using a coating of a suitable plastic instead of lacquer. A

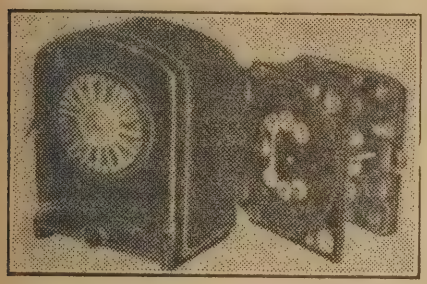


Fig .4.—Complete2-tube-and-rectifier radio.

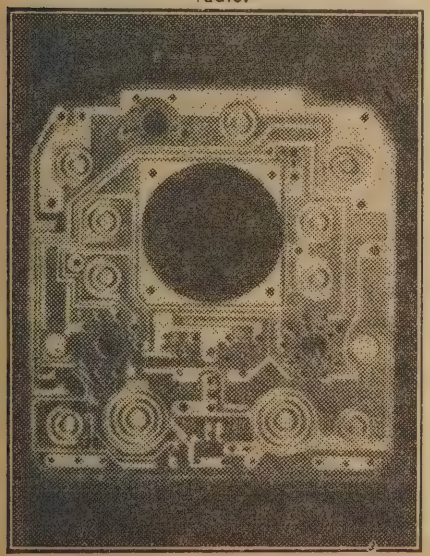


Fig. 5.—Corrugated discs are capacitor forms.

final elaborate circuit test is made automatically in the last section of the machine.

The panels emerge, still on edge, at the output end of the machine and topple gently on to a horizontal conveyor, which takes them to the operators who perform the few manual assembly tasks necessary.

All prefabricated components, such as electrolytics, large transformers and loudspeakers, are designed so that they can be plugged in and clinched in sockets provided by the machine. The only other piece of manual assembly is to connect the various panels to each other. This is done by metal rods, plugged in and clinched to form spacers and electrical connections between panels.

In the ECME system, radio sets are built from numbers of small panels connected in the way described. Apart from its convenience in the machine, the system has other important advantages. The cost of individual panels is trifling. Should a breakdown occur in a receiver, the serviceman, having tracked the fault to a particular panel, simply fits in a replacement and throws the defective unit away. Fig. 5 shows a 2-tube receiver made up of two panels and cabinet.

The receiver is a simple 2-valve plus rectifier ac-dc model, designed for ease of production, economy of materials, and also with an eye to the Middle East export market. It has three preset tuning positions.

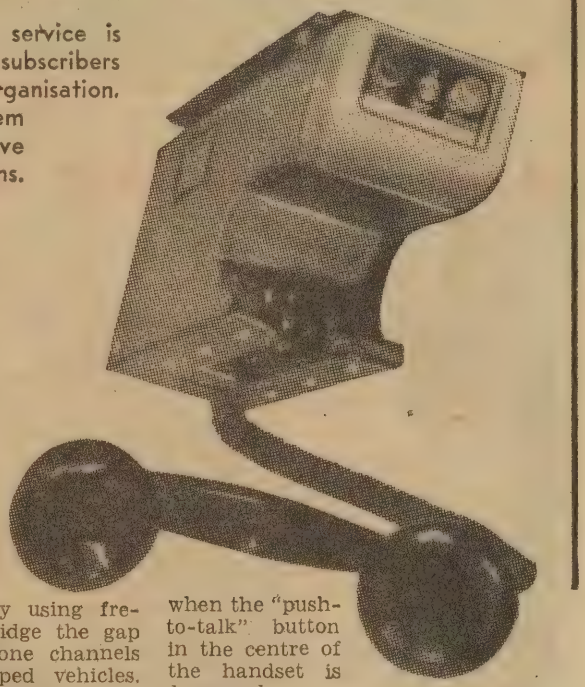
Sponsors of the system claim that conventional tuning arrangements are possible using inductance control.

Advantages claimed include the preclusion of errors in wiring and the fact that a complicated plate costs is no more in production than one having fewer components. Extra resistors and condensers are merely an extra indentation on the moulded plate.

Labor costs are light, the possibilities of poor joints are minimised, and the equipment is light, rugged, and easily made impervious to moisture. (From "Radio Craft," September, 1947.)

# MOBILE TELEPHONE SERVICE

**Mobile radiotelephone service is now being provided to subscribers in US by the Bell Organisation. This relatively new system provides 2030 selective signalling combinations.**



THE act of "calling" or "receiving" a mobile radiotelephone call is no more complex than the same operation with a wire line telephone. Transmission standards are equal to wire line service and no "tuning" is necessary.

This new service which combines wire telephone operation with short-wave radio is remarkably clear and free from "dead spots," fading or static. This perfection is obtained by using frequency modulation to bridge the gap between the wire telephone channels and the specially equipped vehicles. two bands are allocated for this service. One operates in the 152-162 megacycle band and its counterpart operates in the 30-44 megacycle band.

Equipment on the vehicle consists of a radio receiver and transmitter, an 18-inch stand antenna, a selective signalling device and a telephone instrument. All controls and the cradle telephone are conveniently mounted under the instrument board of the car in a single unobstructive unit.

On the left of the control panel is a small lamp, which lights to indicate an incoming call. A regulation bell signal is also used. The bell stops ringing after a short interval, but the lamp remains lighted until the driver acknowledges the call. The driver is thus notified that he had been called during his absence.

With the switch in the "on" position, the receiver is in operating condition, ready to receive a call while the transmitter is in a standby condition. The transmitter is ready to operate when the handset is removed from the cradle, and operates when the "push-to-talk" button in the centre of the handset is depressed.

Each mobile installation is assigned a five digit number, prefixed by a channel designation of two letters. Because the number "I" is used as a selector "return to normal" pulse, the station number never includes the digit "one." As an example, "WJ6-2834" . . . WJ, is the channel designation and 62834, the mobile station number.

## DIALLING OPERATION

When a call comes in, the mobile telephone traffic operator dials the digits for this particular station. In so doing, she causes the control terminal equipment to modulate the land transmitter, with a series of pulses of 600 and 1500 cycles. These pulses cause all selector sets assigned to the same channel to be actuated. Stop pins in the cog wheel of the selector in the receiver called will cause only that selector to be positioned to ring a bell and light a call lamp in the vehicle. All other selectors will fail to reach the final or signalling operation.

# EARLY INVENTIONS IN RECORDING

Back into history—Richard Arlen listens to an ancient gramophone of the cylindrical record type in one of his early pictures.

**Of all inventions that have profoundly influenced our lives the talking machine ranks as one of the greatest, for with its aid, culture has been fostered, geographical boundaries have been narrowed, education facilities and isolation almost eliminated.**

KNOWN by various names, such as "phonograph," "gramophone" and many others, the talking machine is a vital force in radio broadcasting, bringing to the millions the voices of the world's great artists, the tones of great instrumentalists, the world's greatest orchestras and conductors.

Of course, opinions vary as to the degree of greatness, and many will maintain that as well as being a blessing, it may sometimes be otherwise described. From the "bobby soxer" to the symphony enthusiast, from the crooner to the "world famous tenor" the talking machine has brought controversy. It has also driven many a person to seek seclusion and peace in other places, for, after all, one can have too much of anything. With broadcasting going on for 24 hours a day, with recorded serials and music, and with the younger members of the family always ready to listen in at any old time day or night, one must find peace somewhere.

There is the story of the commercial traveller (don't worry) who wished to have an early breakfast in order that he could catch a train leaving at about 6 o'clock. On asking the proprietor of the hotel if it would be possible to have a cereal, the proprietor indignantly replied that he didn't mind supplying a cup of tea so early, but if the traveller thought that he could wake the whole house with the wireless on he had another think coming. It just shows you what a bad name some of these things get. But to get on with our story.

The story of man's attempt to produce instruments which would speak is a very interesting one. When man first started to think about such things is not clear. As a matter of fact, when one thinks of it, it is an amazing thing why man wanted to fool about with the idea at all. Couldn't we have been satisfied with what he had? Did his wife fall down on the job? Haven't we always had politicians?

## FIRST IDEAS

The fact remains that about the middle of the 18th century, man had a fair idea of the nature of sound and one of the facts he learned was that the production of sound by the human voice depended not only on the vocal cords, but upon the modifying action of the mouth and tongue.

A fairly good representation of the vocal cords can be made by stretching two rubber bands close together across a cotton reel. The tube in the centre of the reel represents the human windpipe, and upon blowing down this tube, the rubber bands will vibrate and produce a sound, just as the lungs expelling air through the windpipe will cause the vocal cords to vibrate and produce sound.

If, now, the inside is removed from an orange through a slit, and the cotton reel with the rubber bands inserted through a hole opposite this slit, we have an imitation mouth with a pair of lips. Blowing through the tube will cause the bands to vibrate, and produce a sound. If the imitation lips are closed quickly twice in succession, the word "Ma-Ma" will be produced. This is probably the simplest kind of talking machine and from this, more complicated varieties have been produced.

## TALKING TUBES

In 1779 the Imperial Academy of St. Petersburgh (now Leningrad) offered a prize for the best results obtained from an investigation of the nature of the elementary sounds expressed by the vowels a, e, i, o, u. It was necessary to determine (1) The nature and character of the sounds of the vowels A, E, I, O, U and (2), Is it possible to construct an instrument which can accurately produce these sounds?"

Professor Kratzenstein won the prize by making a series of tubes shaped like those shown in Fig. 2. A considerable amount of work was entailed in the solution of the problem and the final shape of the tubes was arrived at after measuring the apertures of the mouth, lips, teeth, tongue and the positions of the various organs. When the lower end of the tubes were blown into through a reed the vowel sounds A, E, I, O U were distinctly produced.

# HAVE BROUGHT MUSIC TO MILLIONS

by Calvin Walters

Almost simultaneously with Kratzenstein's experiments in Russia, experiments were carried out by Von Kempelen in Austria and the Abbe Mical in France.

Kempelen contrived to evolve an apparatus which consisted of a tube containing a vibrating reed attached to a base, within which was a cavity. By blowing down the tube, the vibrating reed emitted a sound which could be modified by inserting the hands in various positions inside the cavity. Later improved apparatus consisted of a hollow oval box, with portions hinged on to it which could be operated like jaws. Finally, with an improved model of this, Kempelen could produce words like "astronomy," "opera," and whole Latin sentences such as "Romanorum imperator semper Augustus." He could even make the machine talk in French, and give sentences like "je vous aime de tout mon coeur." This, it must be admitted, was quite an achievement.

## MICAL'S MACHINE

The Abbe Mical of France went a bit further by producing artificial heads which could be made to utter words. How this was done is rather a mystery, as the Abbe did not divulge his secret and this died with him. The heads he smashed to pieces, after being disappointed with the award made by the French Academy. He died shortly afterwards. An eye-witness maintained that the heads were covers for a box fitted with artificial vocal cords. Air directed through artificial wind pipes on to the cords produced sounds which were modified by hinged portions of the boxes operated by a skilled person by means of a keyboard.

Another attempt at this kind of apparatus was made with a measure of success by Faber, in Vienna. He constructed a machine as large as an ordinary church organ fitted with a vibrating reed, which could be varied in pitch. There was a cavity, the dimensions of which could be altered by a keyboard and a rubber tongue and lips to form consonants.

## PUBLIC ADDRESS

It is interesting to note that the main reason for all these laborious labors was to construct a machine which could produce a voice powerful enough to command armies and make public pronouncements. None of these poor fellows' efforts was very successful from this point of view, as no machine could be produced which could equal the human voice in power and clearness of articulation.

Worthy of note here is the fact that all efforts were at this time concentrated in an endeavor to originate sounds, whereas the present method is to reproduce them. It was to this end that later attempts were directed with such amazing success.

It is well known that when a tuning-fork is struck, the sound emitted is caused by the vibration of the prongs of the fork. This vibration can be made visible by attaching to one prong of the fork a small point such as a needle and after the fork is set in vibration, rapidly drawing the point along a piece of smoked glass. The impression left upon the smoked glass will take the form of a wavy line, as shown in the diagram. (Editor, see Fig. 4, Page 149.)

This feature was made use of by M. Leon Scott, in his early instrument, called a Phonautograph, a picture of which is reproduced here. This instrument is very important, as being the forerunner of Edison's phonograph. It consisted of a cylinder, around which was wrapped a film of paper or other substance, coated with lamp-black. In contact with this film was a point attached to a membrane stretched across the small end of a conical horn. The cylinder could be revolved by means of a handle attached to a threaded rod, which moved the cylinder backwards or forwards, so that the needle or stylus did not traverse the same place twice.

Wavy trace produced by a tuning fork on a smoked plate.

Upon speaking into the horn and at the same time turning the handle, the membrane was caused to vibrate. This vibration was conveyed to the stylus, which in turn transmitted the vibration to the smoked surface of the revolving cylinder, thus leaving an impression of the vibration on the smoked surface.

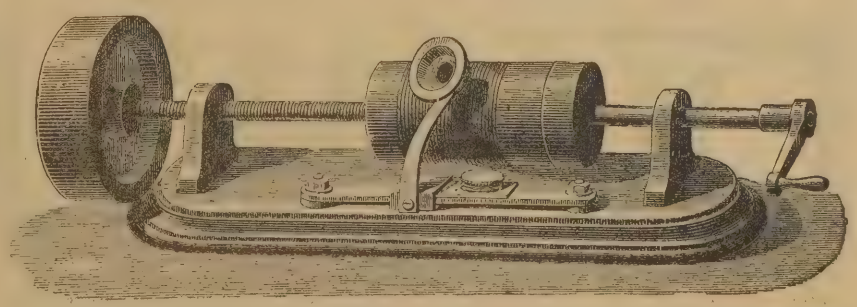
Thus we had the first sound-recording apparatus. The problem then became one of reproducing the sounds recorded on the film. Little did Leon Scott think that his machine would be the forerunner of Edison's phonograph and later of the talking film. The principle used in talking films is very similar to that used in the Phonautograph. The difference is that, instead of the sound impressions being conveyed to the film by an etching stylus, it is done photographically. So we come to that famous inventor, Thomas A. Edison, the man whom we can blame for much of the beautiful and much of the raucous sounds emitted by our phonographs and radio sets.

## EDISON'S INVENTION

In 1877 Edison devised his talking machine. Like Scott's Phonautograph Edison's machine consisted of a conical horn to which was attached a membrane at its smaller end, a stylus, a revolving cylinder and a handle for turning and moving onwards this cylinder. The essential difference lay in the stylus which, whereas in the Phonautograph it vibrated from side to side, in the phonograph it vibrated up and down in a direction parellel to the axis of the horn. Thus, when the horn was spoken into the stylus rapidly vibrated AGAINST the revolving cylinder not ACROSS it.

If now, a soft substance is placed in front of this vibrating stylus it will be indented. If while the stylus is vibrating the soft substance is drawn continuously ALONG under the stylus, the substance will be indented with a continuous line which will assume a series of hills and depressions according to the nature of the sound which caused the vibrations.

Having now recorded the sound it was found that, if the operation was reversed and the recorded line drawn across the stylus, this would vibrate according to the character of the recorded sounds.



An early model of the phonograph, cranked by hand, of the type used by Edison in his pioneer work.

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Ideally suited as a signal generator.

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This vibrating stylus in turn conveyed the vibrations to the membrane, which then transmitted them to the air in the horn and so to the ear drum, which heard the vibrations in terms of the original sound which caused them. In essence, the process consists of recording a permanent impression of an extremely complex but natural compound vibration, and using this impression as a mould for reproducing the vibration. Man has nothing to do with the production of the complex vibration beyond being the medium through which the vibration is produced.

## EDISON'S DRUM

In Edison's first machine, which was somewhat similar to the diagram reproduced here, the revolving drum was turned with a handle attached to a threaded axle, which caused the drum to move along under the stylus. A fairly constant speed was maintained by means of the fly-wheel, and in reproducing the sound it is important that the drum be revolved at the same speed at which the impression was taken.

The first medium used for taking the impression was a thin sheet of tinfoil which was wrapped around the cylinder. In later machines improvements were made and wax and other more permanent substances were used and the cylinder was revolved by spring motors.

When the machine was placed before the public it was met with incredulity and astonishment as may be imagined, and in a demonstration of the device before the French Academy of Sciences one member declared that the results were brought about by ventriloquism.

The vast improvements made in recording and reproducing machines since Edison's first discovery are well known. Edison's machine had many defects such as its inability to reproduce the higher tones so that most speakers and singers were reproduced with a distinct lisp in their speech. Low tones were also impossible of reproduction.

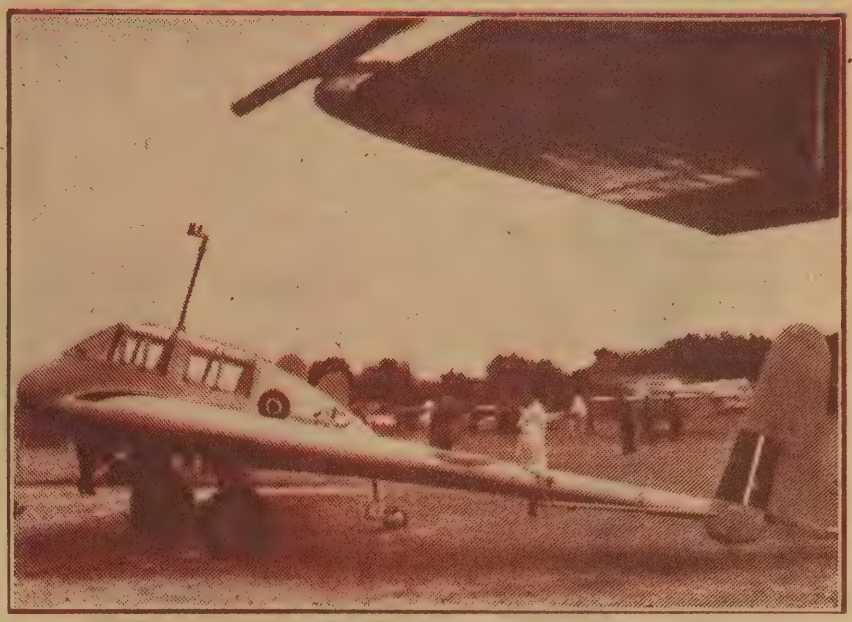
## OLD MODELS

Nevertheless, many of us still remember the Edison cylinder records whereon the item recorded was announced in a majestic manner by a voice in this manner "Stop Your Ticklin', Jock, sung by Harry Lauder; Edison Record." One could purchase midget machines ranging from the "Edison Gem" with a tin horn about a foot long, corresponding to a portable machine, to an ornate arrangement with a brass horn from four to six feet long which, while emitting a great amount of noise also created a wonderful impression with the small boys around the corner store which often played the machine with the horn sticking out the door or window.

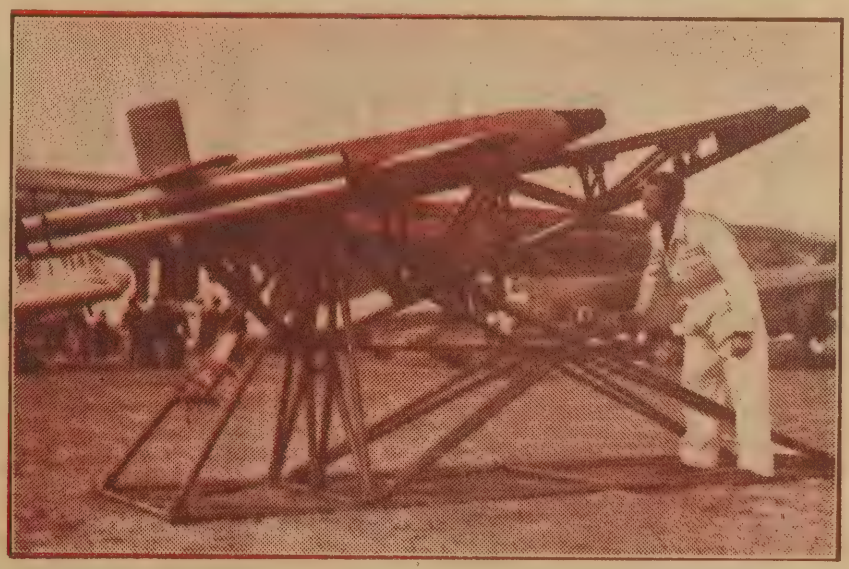
The original method of recording by Edison, known as the "hill and dale" method owing to the indentions being engraved up and down in the recording material, is still used today in the manufacture of "wide range" records. Undoubtedly the reproduction from this type of recording is very wonderful. But the more usual method of recording is to engrave a record into the material by a stylus which moves from side to side. This has been vastly improved at the present time and it is now possible, by means of electrical recording and reproduction, to record and reproduce sounds covering practically all the frequencies within the range of human audibility.

It is not necessary here to detail the methods of modern recording and reproduction. Enough has been said upon this subject by others. Much could be said about talking films and telephones, but even then it would be seen that present progress is due to the efforts of those early pioneers who laboriously strove against tremendous odds to make speaking machines. Leon Scott, the Abbe Mical, Kratzenstein, Von Kempelen, Professor Willis, of Cambridge, who improved on Kempelen's apparatus, Faber and many others paved the way for men like Edison who, with his remarkable perception was able to produce a machine which today has passed the stage of luxury and become a most necessary instrument for cultural development, perhaps, indeed, the most important instrument for this purpose known to man.

## AT BRITAIN'S £10,000,000 DISPLAY

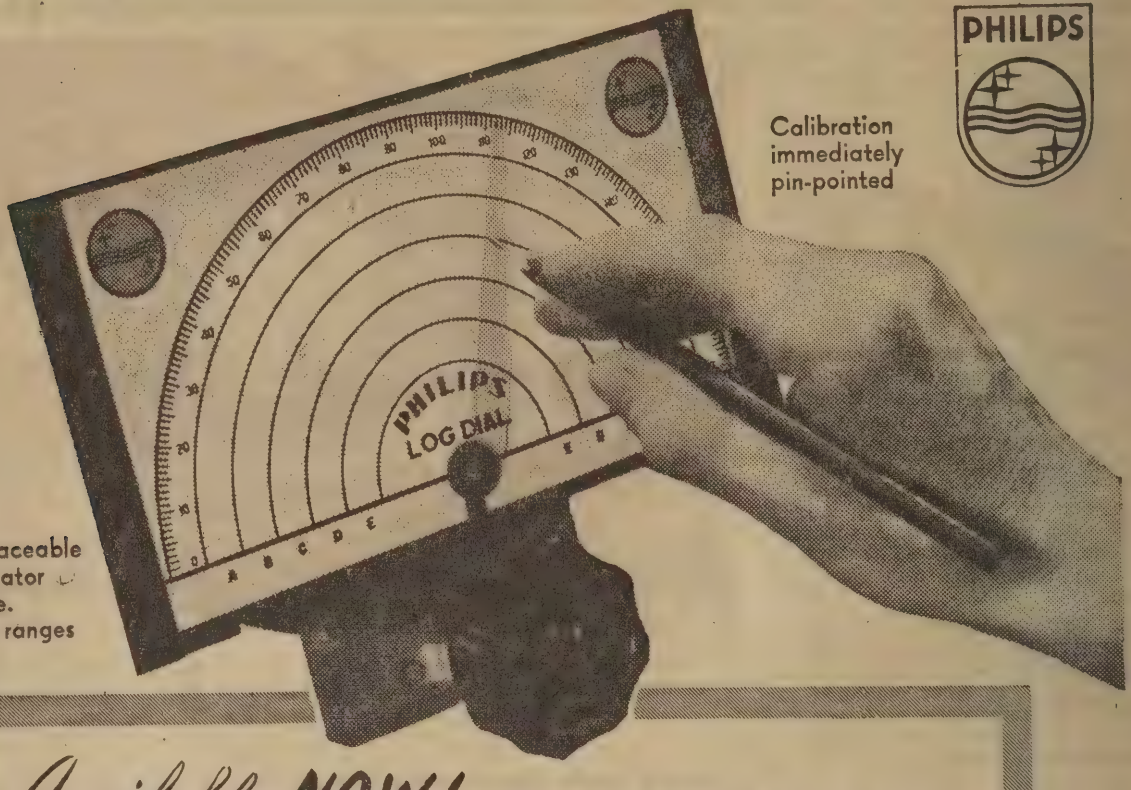


Visitors from all parts of the world attended the first four-day display and Exhibition of the Society of British Aircraft Constructors in England last month. Above—a tail-less research glider with a "V" wing form.



A British guided missile — a rocket projectile on view at the Exhibition.

PHILIPS




Calibration immediately pin-pointed

Replaceable Indicator Scale. Five ranges

*Available NOW!*

# PHILIPS LOG DIAL

## for easy, accurate, individual calibration

25/-

Specially designed for transmitting radio amateurs, short-wave listeners and equipment engineers, the new Philips "Log-Dial" is the ideal control and indicator mechanism for VFO (Variable Frequency Oscillator) Transmitter application, Amateur Band HF Receiver bandspreading, VHF Receiver tuning. Frequency Meters, Monitors and for many other radio and electrical applications.

The Philips "Log-Dial" mechanism provides positive, smooth running with no slip or backlash. It has an ample reduction ratio for quick or slow tuning; calibration cannot be affected by mechanical troubles. The off-set Cursor provides instant logging without the need for scale reference or movement. The two-colour scale is removable and replacements are available. It may be mounted on front of or behind instrument panel. The Philips "Log-Dial" is designed for ¼ inch shaft drive but is adaptable to larger sizes. It is finished in Florentine Bronze.

● The "Log-Dial" is available *now* from your nearest Philips branch; the price is only 25/- with special reduction for licensed amateur radio transmitters.

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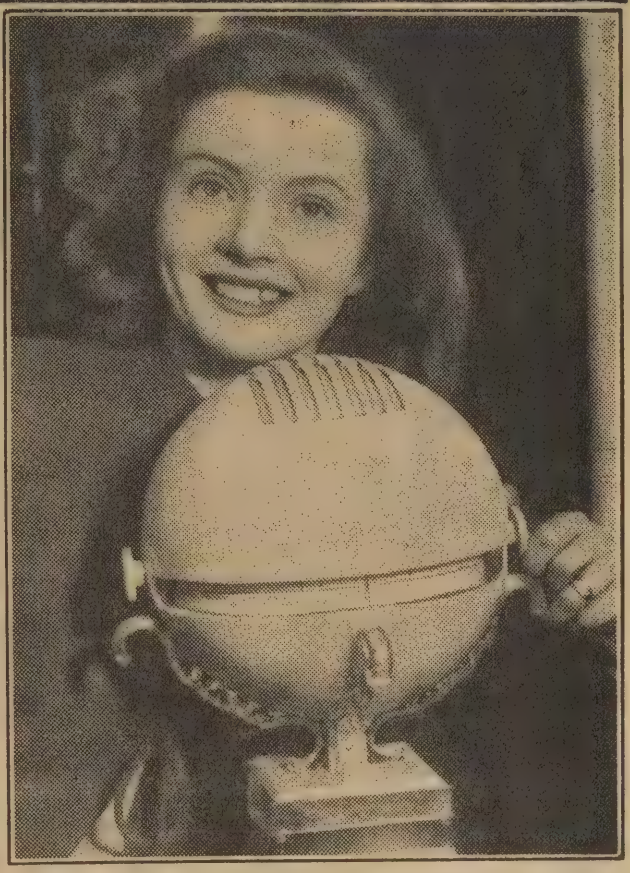
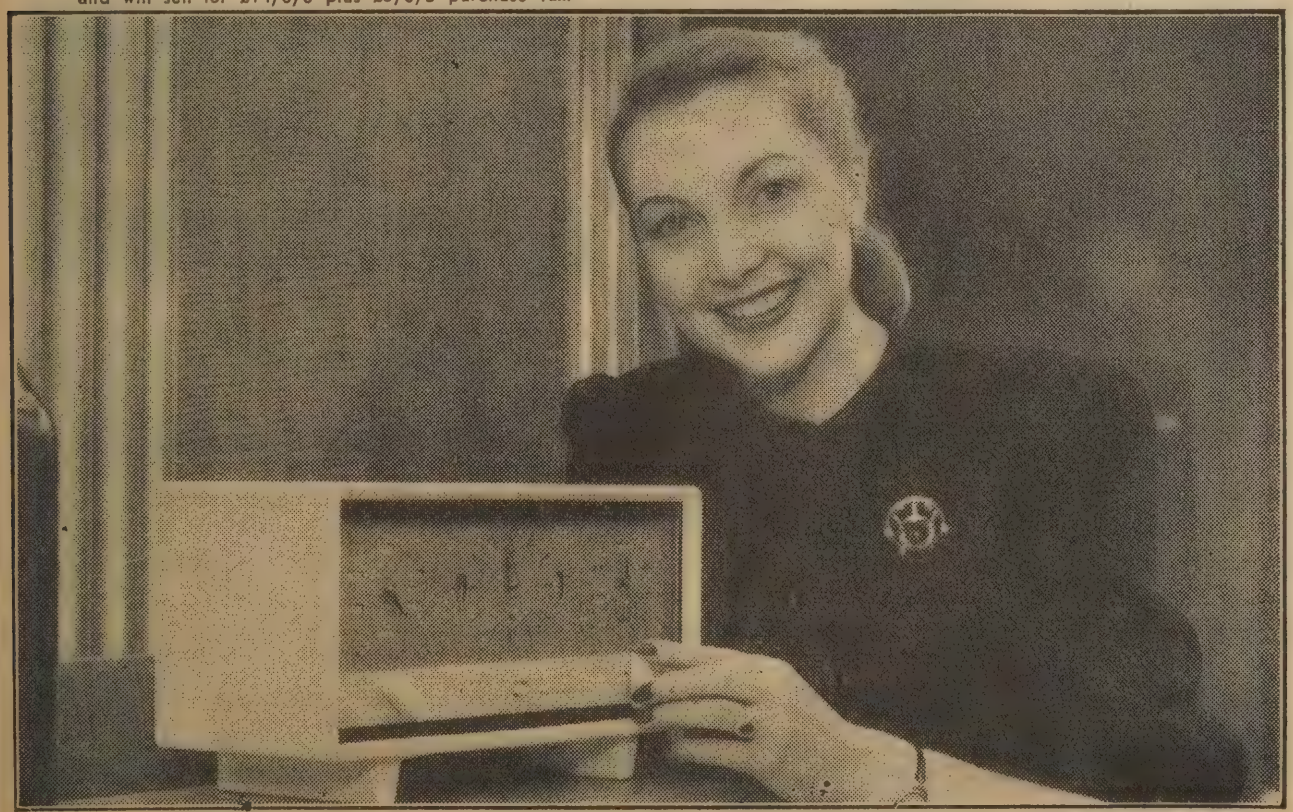
G23A

# SOME RADIO WONDERS FROM BRITISH OLYMPIA

A visitor from Holland inspects the Kelster-Brandes model BW 20 wall set. It is a 4-valve superhet for AC mains, specially designed for hanging on the wall in restricted space, and will sell for £14/0/0 plus £3/0/3 purchase tax.



The Champion Venus set, a 5-valve AC/DC superhet at the show. It has a built-in Hearoscope Aerial. It will retail at 15 guineas, plus £3/10/0 tax.



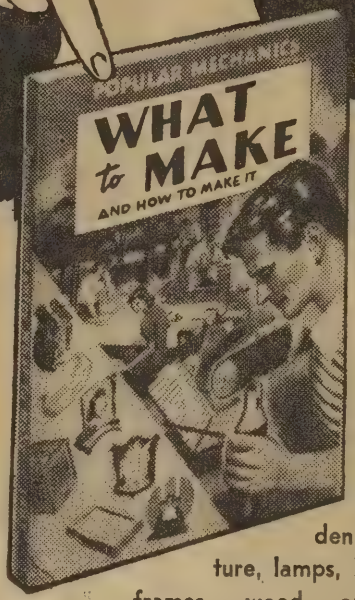
The new Ecko Radiotime set on view. It switches itself on and off and sounds its own alarm if no suitable station is broadcasting. It will be on sale for 23 guineas, plus purchase tax.

# WHAT to MAKE

1947 VOLUME

## Popular Mechanics Home Workshop and Hobby Guide

3/6 (POST 4D) ORDER EARLY




The New 1947 "What to Make" volume contains 208 pages and more than 400 illustrations. Get more fun . . . and profit too . . . out of your spare time with this Popular Mechanics book. Everything is explained in detail and over half of the book is devoted to pictures and plans. You do not have to be an expert to turn out practical and attractive articles if you let this book be your guide.

### *Practical . . . Usable . . . Helpful . . . in Hundreds of Different Ways!*

You will always know what to make and how to make it with this book to guide you. It contains hundreds of workshop ideas using simple tools—all of which have been put to the practical test. If you have other "What to Make" books be sure to order this new volume 8 and keep your library complete.

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Sideboards, benches, furniture, book ends, chairs, toys, games, photo equipment, leather craft, bookbinding, garden and porch furniture, lamps, bookcases, picture frames, wood carving, jigsawed novelties, cabinets, playhouse, home modernisation, waste baskets, etc., etc.

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89 Castlereagh Street, Sydney.

Please send me

(1) "What to Make and How to Make It", 1947 Edition; price 3/6 (post 4d.)

(2) "Shop Notes"; 1947 Edition; price 3/6 (post 4d.)

(a) for which I enclose payment.

(b) Charge to my account.

NAME .....

ADDRESS .....

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(TECH.R&H.11/47

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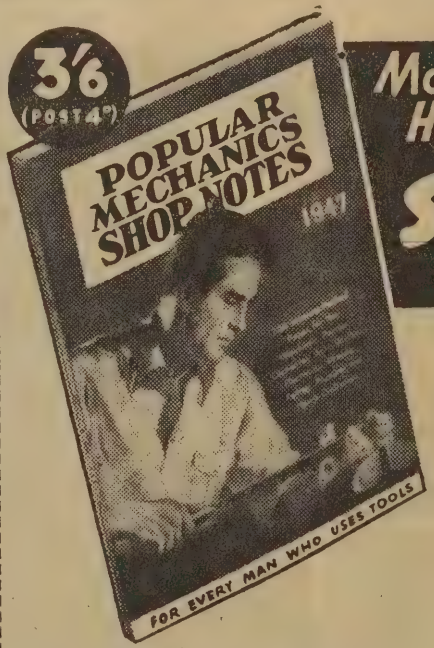


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# SHOP NOTES

POPULAR MECHANICS SERIES

Here is the 1947 volume of the famous books that are giving practical know-how and helpful information to thousands of users every year. Every page is filled with money saving facts you can use based on the experience of hundreds of successful mechanics. "Shop Notes" are of equal value to the professional mechanic and the amateur in his own workshop.

### "Worth its Weight in Gold"

This is a frequent expression from users. One mechanic says he owes his success to Popular Mechanics "Shop Notes." Another said whenever he was up against a job new to him, he consulted his "Shop Notes" which told him how to do it. This new 1947 volume contains 208 pages with over 670 interest-packed pictures.

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Latest in series of practical year books this new volume contains hundreds of money making and time and labor saving ideas—kinks and ideas for machinists, auto workers, sheet metal men, painters, carpenters, plumbers, electricians, home repairers—all other trades and needs.

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# HOW VALUABLE ZINC IS EXTRACTED

ZINC burns in air, forming the oxide ZnO (zinc white).

Zinc is generally met with in combination as the carbonate (calamine) and the sulphide (zinc blende). It also occurs as silicate (hemimosphite) and as red zinc ore.

Extraction of the metal is carried out in two stages, the oxide being first formed. In the second stage this is reduced by carbon. Blende is the ore usually used. The process is illustrated here in diagram form.

Zinc-blende, which is the sulphide of zinc (ZnS), is fed into the blast furnace, seen in the upper left-hand corner of the sketch. A blast of hot air passing through the furnace causes oxidation and produces zinc oxide. Sulphur dioxide passes off to a converter for the manufacture of sulphuric acid.

## TO THE FURNACE

The zinc oxide passes down through three hearths and is fed into a container with powdered coke. The mixture of powdered coke and zinc oxide is then wheeled to the retort furnace.

It is fed into fireclay retorts. These are stored in a furnace, which is lined with fireclay. Into the base of this furnace producer gas channels rise from ovens in which steam and air are passed over hot coke. This producer gas heats the retorts to 1400 deg. Cent.

The heat causes the carbon of the coke to combine with the oxygen of the zinc oxide in the retorts, leaving zinc, which is given off as vapor.

The vapor condenses as it passes from the retorts. The liquid zinc is tapped into a travelling ladle. Part is collected as a fine powder known as zinc dust.

The zinc thus obtained contains other metals as impurities, chiefly lead, antimony and arsenic, and it is purified by heating the molten metal in a reverberatory furnace, when most of the impurities rise to the surface and can be removed. Electrolysis is now widely used for purifying zinc and it makes it possible to achieve a far greater degree of purity than could be obtained by earlier methods.

## GALVANISING IRON

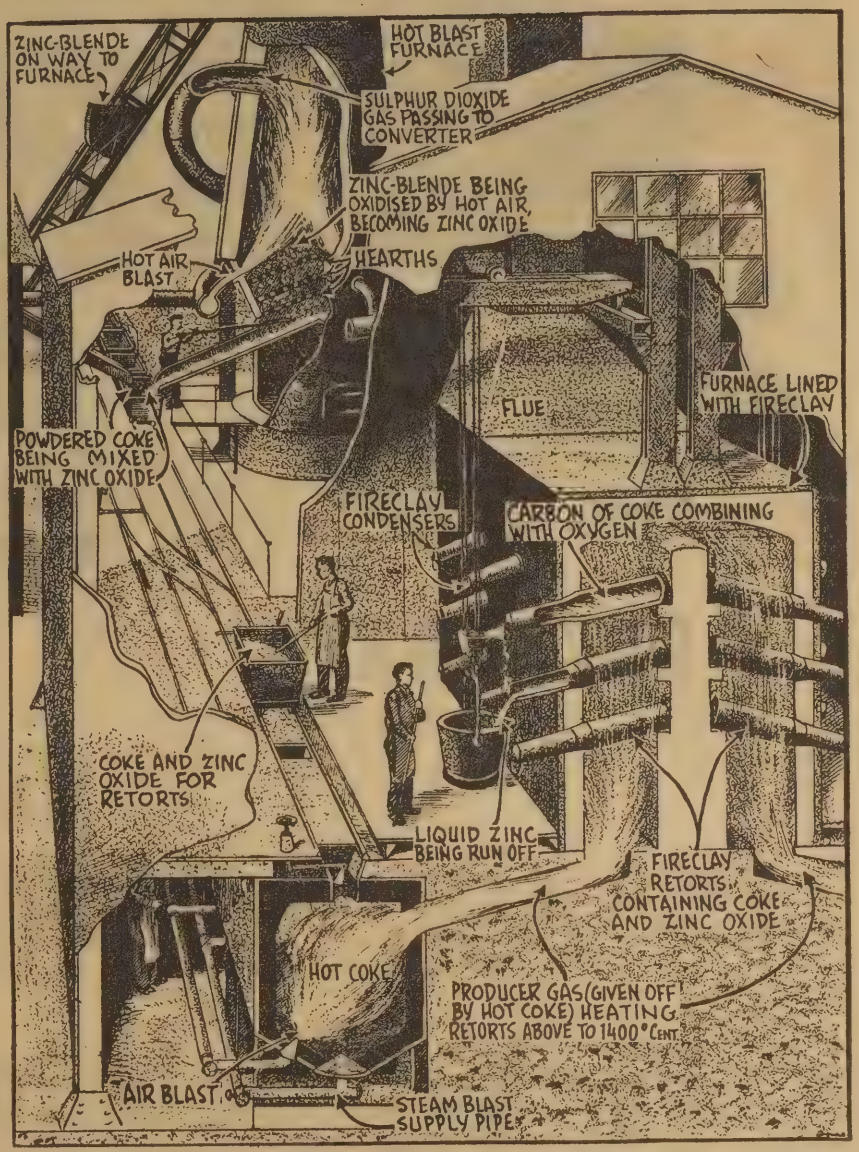
In galvanising iron, molten zinc is applied to sheet iron, which is first cleaned with sulphuric acid or a sand blast. The zinc furnishes a protective coating that prevents the air and moisture getting to the iron. The flaky appearance of the finished iron is due to the crystals of zinc on its surface.

Sometimes, instead of dipping the sheet iron into fused zinc, the iron is covered with zinc dust and then heated. The product is known as sherardised iron.

The zinc protects the iron from rust in two ways—first, by providing an airtight covering that lasts for a considerable time; and second, even when the zinc has become weathered, it seems to rust in place of the iron.

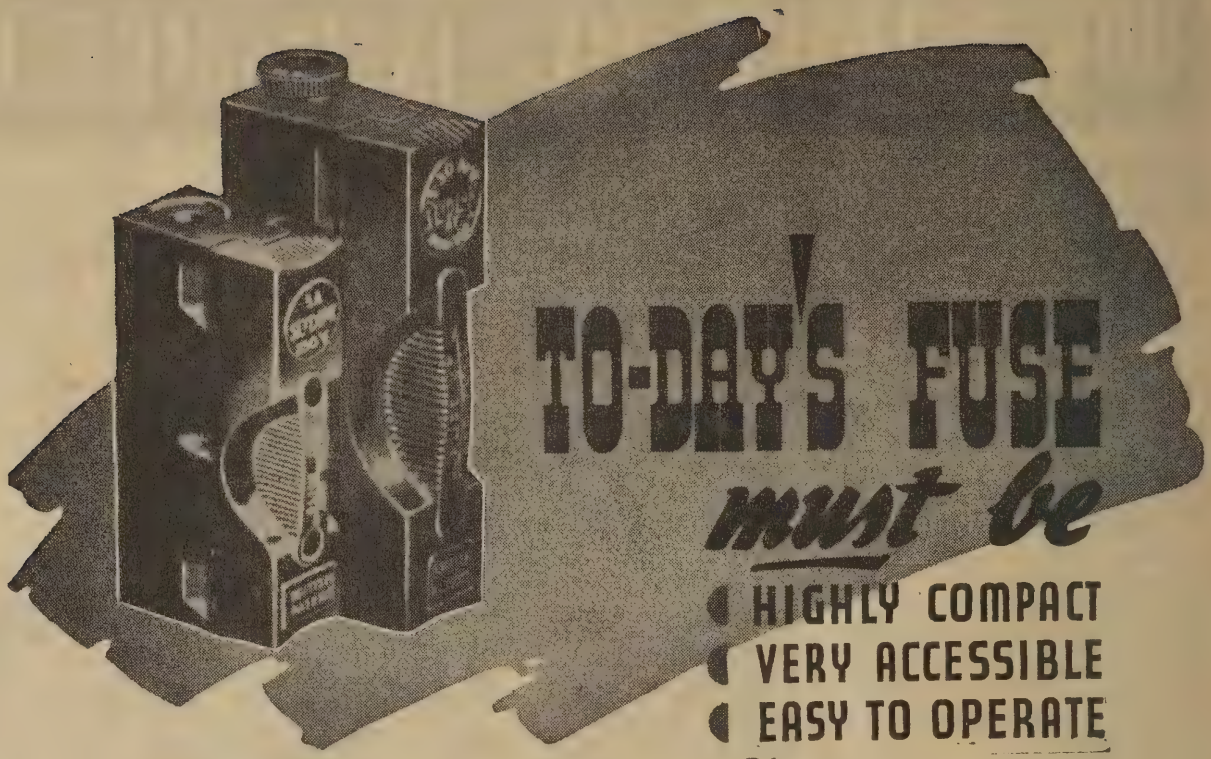
A bluish-whit crystalline metal, zinc can be rolled into sheets between heated rollers when the metal is raised to a temperature of from 120 deg. to 150 deg. Cent. When cold the metal is normally brittle; but when rolled it retains its pliability even when it again becomes cold.

At temperatures from 200 deg. and 300 deg. Cent., however, the metal again becomes brittle and at 419 deg. it melts. At about 925 deg. it boils and becomes vapor.


ZINC-BLENDE ON WAY TO FURNACE
HOT BLAST FURNACE
SULPHUR DIOXIDE GAS PASSING TO CONVERTER
ZINC-BLENDE BEING OXIDISED BY HOT AIR, BECOMING ZINC OXIDE
HEARTHS
HOT AIR BLAST
FLUE
FURNACE LINED WITH FIRECLAY
POWDERED COKE BEING MIXED WITH ZINC OXIDE
FIRECLAY CONDENSERS
CARBON OF COKE COMBINING WITH OXYGEN
COKE AND ZINC OXIDE FOR RETORTS
LIQUID ZINC BEING RUN OFF
FIRECLAY RETORTS CONTAINING COKE AND ZINC OXIDE
HOT COKE
PRODUCER GAS (GIVEN OFF BY HOT COKE) HEATING RETORTS ABOVE TO 1400° CENT.
AIR BLAST
STEAM BLAST SUPPLY PIPE

**Zinc has many uses in the modern world. In sheet form it is valuable in roofing, the lining of airtight packing-cases, for kitchen utensils, in photo-engraving (block-making), and in the making of electric batteries and galvanised iron. Brass, the alloy of copper and zinc, and bronze, the alloy of copper, tin and zinc, are both widely used.**

OUR cover picture shows a close-up of the 2JU Staright-8 short wave receiver featured in the Australian Short-wave Handbook, now on sale price 2/-.



# TO-DAY'S FUSE *must be*

- HIGHLY COMPACT
- VERY ACCESSIBLE
- EASY TO OPERATE

# SLYDLOK

Fuses meet these requirements in every respect and incorporate also a number of exclusive features, unachievable by any other method of contact than that used. The basic design principle of this method of contact is the patented longitudinally sliding engagement between the cover and the base of the fuse. This ensures natural and true alignment with the base terminals, rigid anchorage without recourse to spring loading and an unshakeable interlock that the severest electrical or mechanical vibration cannot disturb.

Modern design and the Armed Services' requirements of electrical and electronic equipment demand an economical use of space; this in turn, requires components that are small, compact, accessible for maintenance and easy to operate, yet with a high degree of efficiency. That Slydlok fuses more than meet the Armed Services' requirements is synonymous with their ability to fulfil the needs of modern electrical and electronic manufacture. Slydlok fuses are now available in a complete range of ratings from 5-60 amps. Write for further details. Your enquiry will receive prompt, personal attention.

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# NEWS AND VIEWS OF THE MONTH

## British radio show

FROM all reports, the radio exhibition recently held in England was something of a miracle show. All the latest ideas were to be seen, some of which are illustrated elsewhere in this issue.

Apparently, the television exhibits achieved great success. The various models on display were organised to receive the same programme—actually it is possible there was no alternative—so that prospective buyers were able to stroll from one stand to another and compare the results obtained by the various equipments.

In the finer applications of radio, Britain has no need to be ashamed of her efforts. Most of the highlights were items which had much more than a mere novelty value—a characteristic of British endeavor which many consider conservatism. At any rate, her manufacturers appear to be pushing television for all they are worth. They are reaping the benefits of their policy of making a start with what they have at present available, instead of following the American tendency to confuse the issue with all kinds of policy cross-currents.

## Sound—

IN the field of sound recording and reproduction, there is every reason to believe that Britain is the leader. In our view, judged by the quality and general characteristics of disc recordings, the best English pressings have never been bettered anywhere. It so happens that this issue carries several articles on this subject, one of which includes some American comment on English ideas and reproducing instruments.

Since the war, English sound engineers have apparently excelled themselves, and the results of their work are now being appreciated.

It is strange, however, that despite the progress being made with records and pickups, so far not much mention has been made of really good loudspeakers being made available at reasonable prices. Most of the super types have sold at prices well above the average man's pocket, and require installations far too elaborate for him to arrange. What is badly needed is something similar to certain high grade American types available here before the war for about £15. This is not a low price, but there would be many sales for such a speaker, the results from which far outstrip those from the standard 12-inch types now available—occasionally!—in Australia.

However, this matter of high quality sound is something which is just getting under way. There is plenty of time yet for things to happen.

---

## Daylight Films

DAYLIGHT movies which can be seen clearly in the brightest sunlight without drawing shades have been demonstrated by Soviet inventor Ivan Novitzkov, to a gathering of scientists in Moscow.

The new film technique is based on the principle of reflection. A small screen is hung from the ceiling and concealed under a canopy made from dark material. Images are projected on it, but the audience does not see them.

The images are reflected along a channel to a large mirror placed on the stage. Audiences then see the movies clearly in a mirror.

## RADIO CROSS-WORD PUZZLE, No. 3.

**ACROSS**

1. Tester.
4. Receiver.
10. Relating to electric charge.
11. Conductor (two words).
12. Water wheel.
13. Flashlight.
15. . . . rays.
19. Precious stones.
20. . . . Coil.
22. The metallic parts of a switch. (Two words).
23. Metal.
24. Wire holders.

**DOWN**

2. Soft iron core, surrounded by a coil.
3. Over.
5. Aerial.
6. . . . Morse code.
7. Unit of inductance.
8. Windings.
9. . . . valve socket.
14. Stages in series.
16. Coil of a speaker.
17. Valve element.
18. Void.
21. Plate of a valve.

**BELOW:—LAST MONTH'S SOLUTION**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | W | E | A | T | | M | O | R | S | E | |
| A | | I | | I | | | | H | | E | | R |
| F | A | R | A | D | S | | A | M | P | E | R | E |
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| I | O | N | S | | N | | T | | M | E | G | A |
| X | | G | E | N | E | M | O | T | O | R | | Y |
| | | | T | | C | | M | | T | | | |
| E | | M | O | D | U | L | A | T | O | R | | A |
| S | C | A | N | | R | | T | | R | I | N | G |
| S | | T | | A | V | A | I | L | | P | | O |
| A | T | T | U | N | E | | C | O | P | P | E | R |
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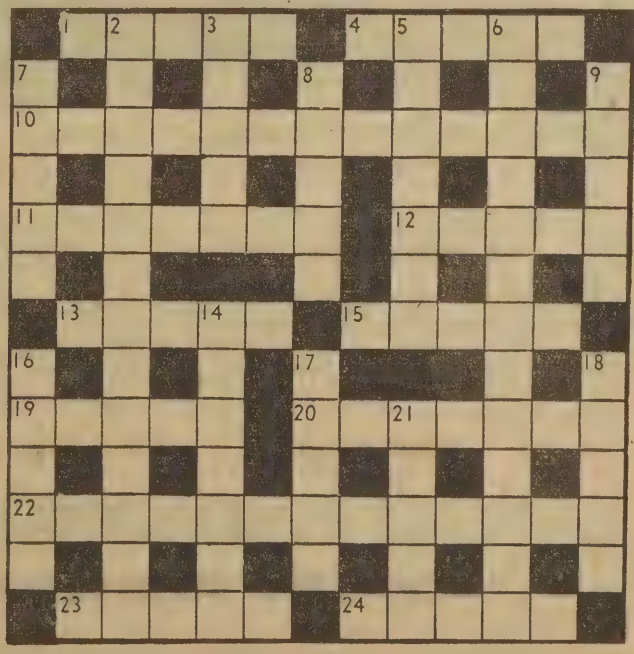
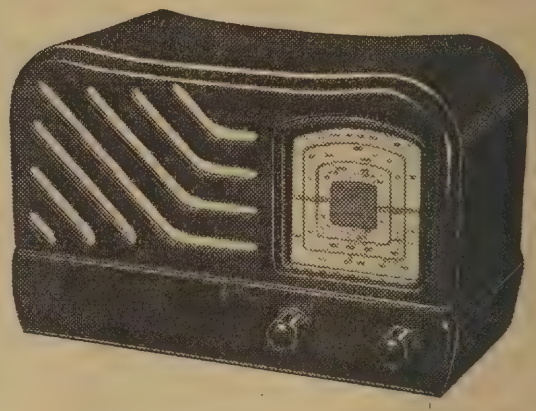


# MAXWELL'S RADIO

## 4 Valve Assembly Kit



Features a Smart Bakelite Cabinet size 10" x 7" x 5½" including a Specially Designed Chassis and Mounting Plates for the Calibrated Dial and Speaker. Fitting neatly on the Chassis the Power Transformer requires the minimum of space.

Chassis Mounting Plate, Dial, Power Transformer and a 5" Per. Mag. MAGNAVOX Speaker completes the assembly kit. Our price: **The Lot £5/5/-**

**Complete Kits with Valves, etc. £12/19/6.**

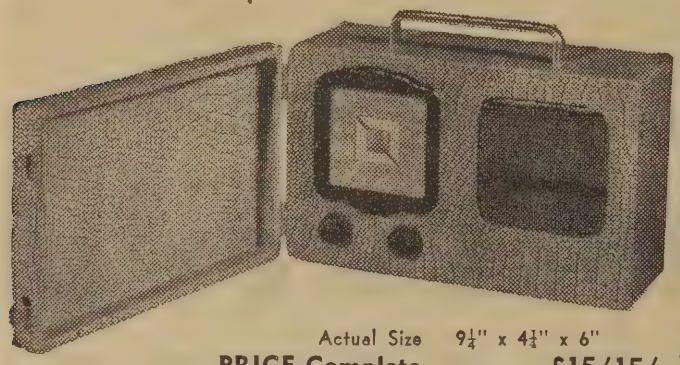
## "HEATMONARCH" Soldering Irons

*"The 8 Feature Iron"*

Under 2 minutes heating
No overheating
No tip-oxidisation
Correct Heat Maintained
Built-in Thermostat
120 Watt
Operates from 220 to 240 volts
SPECIAL PRICE .. .. .. .. .. .. .. .. **32/6**

## MINIATURE COMPONENTS

| | |
|---|---|
| Miniature Chassis for Peanut Tubes | 7/6 |
| IFs 455KC 1¾in. x ¾in. | 14/3 |
| Aerial Coils Iron Core | 5/7 |
| Oscillator Coils Iron Core | 5/7 |
| Qt Osc. Coils to suit IR5 Valve | 4/9 |
| 2 Gang Midcap | 19/3 |
| 3in. Speakers (Large Stocks) | 25/- |
| Transformers to match 3.5 Voice Coil | 11/8 |
| Valve Sockets | 7d. |
| Loop Aerials, 4in. | 7/6 |
| Single Gang Condensers F.N. | 12/6 |
| Valves IR5, IT4, 3S4, 1S5. The Lot | £4/9/10 |



Actual Size 9¼" x 4¼" x 6"

**PRICE Complete .. .. .. £15/15/-**

## 4 Valve Miniature Portable

Set incorporates 4 Miniature Valves, Miniature Coils, Condensers 2 Gang etc., 5" Rola made Speaker and Mini-Max Batteries.

The Cabinet is finished in attractive Leatherette with Smart Chrome Handle and protected by neat closed front.

Easy to follow Tested Circuit with ample instructional data. If desired we will assemble main components ready for wiring.

## PICK-UPS

**English Cosmocord Magnetics**

Low needle impedance. Adjustable tension device. Normal pressure adjusted to 2ozs. at needle point. High permeability alloy magnet head.

**Our Price .. .. 39/6**

## CABINETS

| | |
|---|---|
| Little General | 27/6 |
| Chassis | 7/6 |
| Springtime Portable | 45/- |
| Chassis | 7/6 |
| Miniature Cabinet as photo | 37/6 |
| Chassis | 7/6 |

## 0-1 METERS

**English "Pullen" Brand**

Complete with Calibrated Dial
1000 ohms per volt.
100 ohms internal

**20/6**

*Add Postage to all Amounts ———— Same Day Despatch*

# MAXWELL'S RADIO

**48 ELIZABETH STREET, MELBOURNE. CENT. 4913**

## RUSSIAN RADIO TELEVISION

AT the moment the USSR claims that big advances in both radio and television have been achieved by Russian scientists. Large-scale plans to extend broadcast services of both kinds are also under way. Twenty-five television stations, it is announced, shortly will be in operation, 21 in European Russia and the rest in Siberia.

It is known that work on color television has been going forward for some time, and the latest report is that a color transmitter working in Moscow, has a service area with a 75-mile radius. Much attention is being paid to both the land-line and radio links between main television and vhf sound transmitters and relays sited at considerable distances away.

FM has been adopted to a large extent, particularly for the coverage of big cities, where man-made static due to electrical machinery presents almost insuperable problems with AM.

How much of all this is fact and how much wishful thinking it is impossible to say. One must, however, bear in mind that Russia is the home of many first-rate radio physicists and radio engineers and that almost unlimited funds are available for research and development on approved lines.

Meanwhile the BBC has been making experimental FM transmissions on 45 and 90mc for some time. The conclusions reached as a result of extensive trials are (1) that FM is superior to AM for vhf relays in the quality obtainable and in freedom from interference; (2) that it has also advantages over any form of pulse modulation; (3) that horizontal polarisation is very much better than vertical for suppressing the effects of interference. The BBC has now decided to start regular FM broadcasts from a full sized transmitter as soon as it can obtain delivery of the apparatus. A 25kw transmitter has been ordered from the Marconi Wireless Company.

## The Constellation

THE first of the New Constellation aircraft has arrived in Australia for Qantas Airways.

There are four of these aircraft in all, scheduled for the Australia run. They are being flown here by Qantas personnel specially sent to America for training on the big machines.

They will make history in Australian aviation, being quite the largest and most elaborate aircraft to be used here. They are fitted with an enormous amount of equipment and general facilities designed to make flying as comfortable and safe as humanly possible.

The radio gear, particularly, will be of the latest type available, and despite its comparatively low power as compared with ground station equipment, will allow complete communication coverage in addition to a full scale of navigational aids.

In our next issue we hope to supply some details of this big machine, and the apparatus it carries.

IRC Metallized
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with the
SILENT SPIRAL CONNECTOR
because it's positive—
it's positively NOISELESS
NO SLIDE
NO FRICTION
NO NOISE
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It Eliminates the Most Common source of Noise in any Control.
The outcome of years of engineering development, I.R.C. Brings you this outstanding control improvement—positive and continuous electrical connection between the centre terminal and the adjustment arm. The Silent Spiral Connector spells complete elimination of sliding, metal-to-metal contact in the place where most control noises originate. It means that the I.R.C. Special Replacement Controls are unquestionably quietest because they are the controls having this feature.
The Silent Spiral Connector is made of special wire — sturdy and durable — constructed like a fine watch for a lifetime of the quietest service you can imagine.

*QUIETEST! Because they're the CONTROLS in which sliding metal-to-metal contact has been eliminated*

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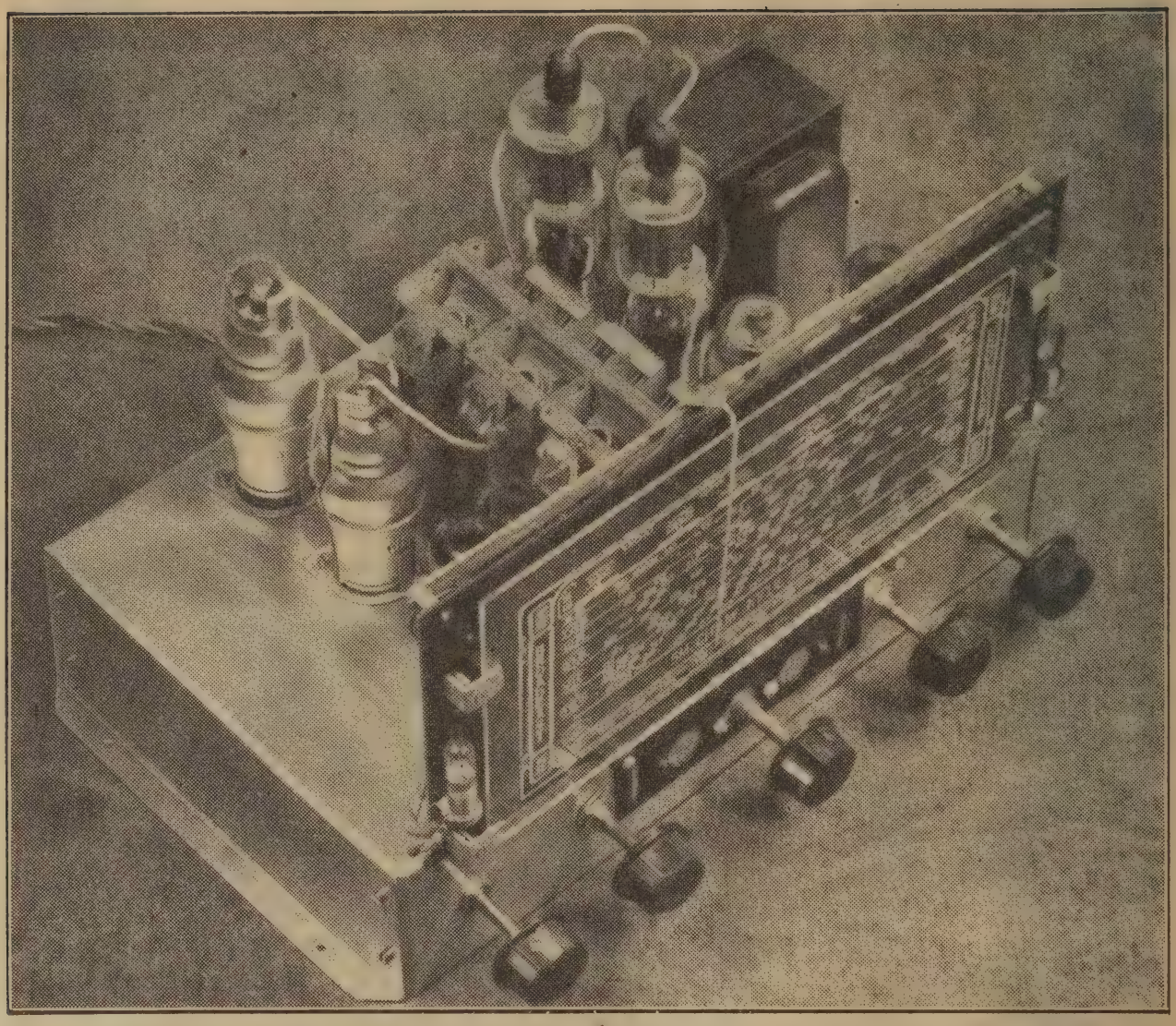


The Radiogram is smaller than many others, as the tuner is simple and the power supply on a separate chassis.

# T.R.F. MAJESTIC RADIOGRAM

**Here is yet another addition to our line of big sets—this time an elaborate TRF design. This new receiver will give you really high quality reproduction from the local stations. It reveals a quality in the music and a "presence" in the voice which you may never have heard before.**

THERE has been much talk, of late, about the improved quality possible with F.M. broadcasting. While this has some foundation in fact, it is equally true that many of the programmes now radiated by the existing stations have a fidelity and frequency range not appreciated by the majority of listeners.

This was demonstrated in no uncertain fashion recently in a lecture before the Sydney division of the IRE. Members were able to make a direct comparison between signals arriving by direct line from the studio and those from an F.M. transmitter and from the National station 2FC.

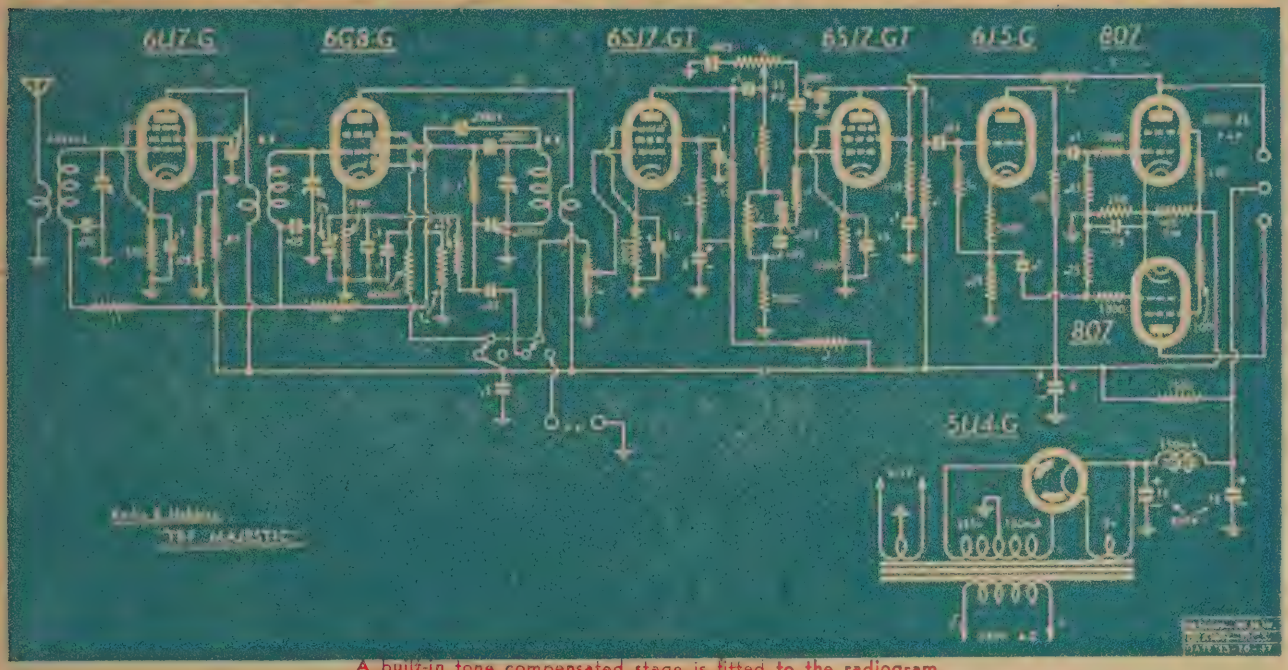
With a special wide range amplifier and the very latest in loudspeaker systems, the reproduction from all three sources was equal to anything we have heard to date. Only the keenest listeners could pick the actual difference in the quality, the A.M. signal being most easily distinguished by occasional crackles of local interference. In an average suburban location, this would not have been apparent.

Following the demonstration, the lecturer pointed out that the distortion level realised between the microphone input jack and the output from a monitor receiver seldom exceeded 3 per cent. for the whole system, with a frequency range of from 30 to 10,000 odd c/s. Furthermore, contrary to popular opinion, no compression at all was used on the signal from symphony concerts and like programmes.

Allowing for the fact that lines will still be necessary, with their patching panels and repeater amplifiers, it is hard to see how any immediate and substantial improvement is possible in the capabilities of the actual transmitting circuits. The major change will of necessity be at the receiving end.

Of course, there are bad programmes as well as good ones. Over-generous

# A T.R.F. TUNER WITH COMPENSATED AMPLIFIER




A built-in tone compensated stage is fitted to the radiogram.

use of mediocre recordings and transcriptions, poor programme lines and other technical deficiencies can produce a very undesirable result and the difference becomes painfully apparent on good quality receivers of any description.

The average listener is seldom aware of the variations, since the treble register is lopped off anyway by the narrow band characteristics of the average domestic receiver. With it goes some of the distressing programme distortion in the upper register, to be replaced by what the receiver adds on its own behalf. And variations in the bass register are likewise masked by the limitations of the receiver.

The receiver may still sound quite pleasant, tune the stations nicely, give a good account of itself on the short-wave band, be free from hum and crackles—and what more does the listener want? The answer, in the vast majority of cases, is simply nothing!

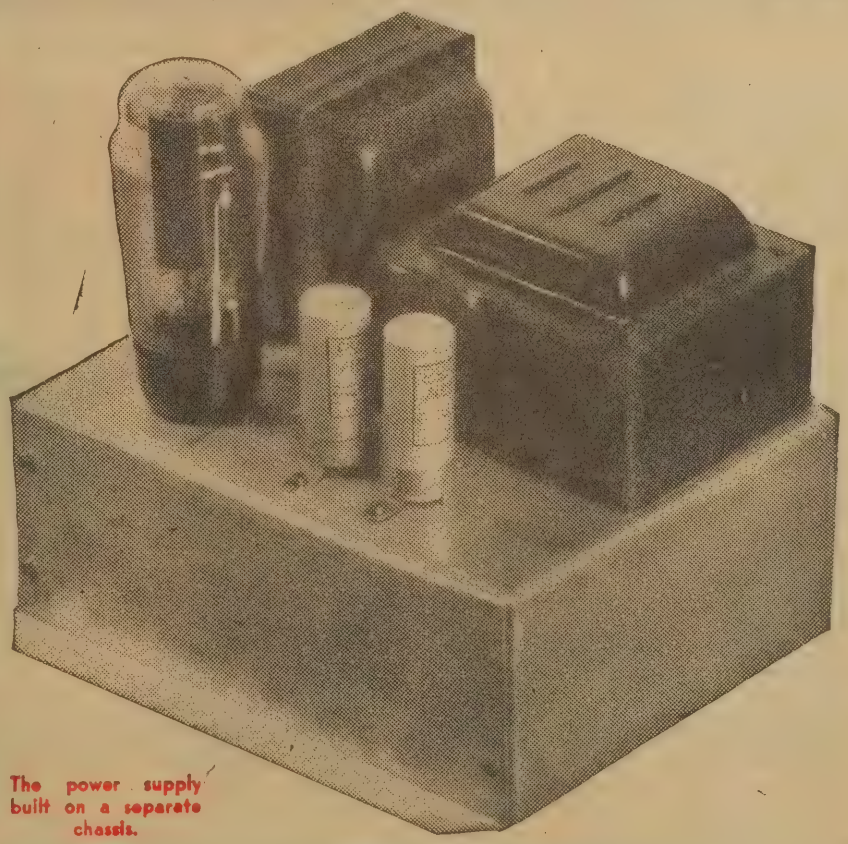
## SPECIAL NEEDS

But there are others who, for one reason or another, are not happy with average reproduction. It may be anything from technical concern to a genuine desire to hear music as it sounds in the concert hall. And because such folk exist, and in greatly increasing numbers, we have talk of high fidelity speakers, FFR recording, new pickups, F.M. fidelity and all the rest.

And for precisely the same reason we have designed this new TRF receiver. Its simple tuning system is broad enough to pass the upper sidebands from the local stations. It has low distortion, low hum level, high power output and a tone control system giving independent control over both ends of the spectrum. It will, therefore, meet the requirements of all those readers who have been asking for circuit reprints of the "TRF Fidelity Nine" which harks back to the June, 1943, issue. This new set is of basically similar design, but uses components which are now available.

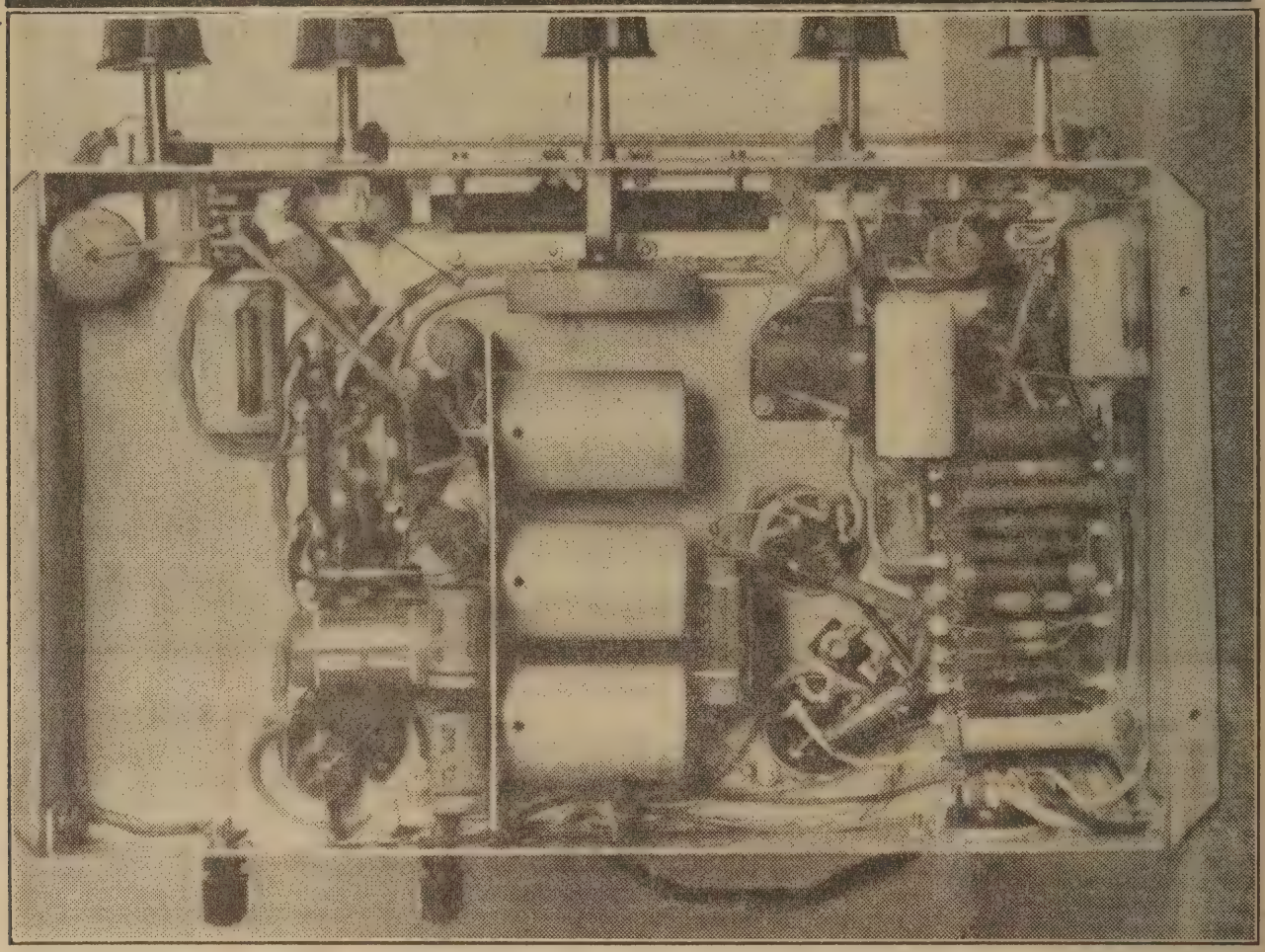
But here a word of warning. Don't get the idea that, TRF circuit or no, this set must tune more stations than another set having only three or four valves and a rectifier. It is not intended to, and it won't. In an average suburban location, this big TRF job will bring you the local stations and perhaps a few of the major interstate stations. But that is all.

If you are going to demand good DX qualities, or if you live beneath the shadow of a transmitting mast, you will be far better off with a set



The power supply built on a separate chassis.

# UNDERCHASSIS VIEW ON THE NEW RADIOGRAM



The tuning coils are mounted on their sides underneath the chassis.

like the 807 Radiogram. Whether F.M. or A.M., it is essentially true that high fidelity reproduction can only come from your own local stations. Having said thus, we can get on with a description of the circuit.

The tuning system is relatively simple. The signal is fed to a standard aerial coil and thence to the grid of a 6U7-G as first RF amplifier. Then through an RF coil to the pentode section of a 6G8-G as second RF amplifier. From the plate circuit of this valve, it passes through another RF coil to the two diodes, which provide detection and the necessary AVC voltage.

## THE COILS

You will, therefore, need a standard aerial coil and two RF coils, a three-gang condenser and a dial to match. No special dial is necessary for a TRF circuit.

The coils used will naturally have an important bearing on the selectivity of the receiver, and therefore upon the sideband attenuation. In the original "TRF Fidelity Nine," constructed during the war years, we used old-style solenoids. These gave just enough selectivity for use in the average suburban location. In more difficult areas, somewhat better coils would have been desirable.

This time we have used modern iron-cored coils, chiefly because they are the only ones which can now be regarded as standard. The selectivity is therefore higher and there is a tendency for the gain to rise at the low frequency end of the band, where the primary windings are near resonance.

This latter fact will possibly cause the receiver to be unstable at the low frequency end of the band, unless it is connected to an aerial and preferably to an earth as well. The same remark, of course, is true in lesser measure of a superhet receiver using an RF stage and high impedance primary coils.

In this receiver we are not concerned with the ultimate in gain and selectivity and, in fact, it is all in the interests of fidelity if the selectivity is reduced to the bare minimum required

## PARTS LIST

1 Receiver chassis 12in. x 8in. x 3in.
1 Power supply chassis 8in. x 6½in. x 3in.
1 Power transformer 385V c.t. 385V. 150mA. 5V 3A, 6.3V 3A, 6.3V 2A.
1 Filter choke 150mA.
1 H type 3-gang condenser.
1 Dial to suit.
3 Trimmers, 30 mmfd.
1 Output transformer 6600 to 10,000 ohms c.t. primary. Secondary to suit speaker.
2 Valve shields.
4 5-pin sockets.
6 Octal sockets.
4 Terminals (2 red, 2 black).
1 D.P.D.T. rotary switch.

RESISTORS

2 2 meg., 2 1 meg., 1 .5 meg., 3 .25 meg., 7 .1 meg., 1 .06 meg., 5 .05 meg., 1 .05 meg. 3 watt, 1 7500 ohm 20 watt W.W., 1 7000 ohm, 1 5000 ohm, 2 2000 ohm, 2 1000 ohm, 1 250 ohm 3 watt W.W., 2 100 ohm.
3 1.0 meg. potentiometers.

CONDENSERS

1 16 mfd. 600 P.V., 1 16 mfd 525 P.V., 2 8 mfd. 525 P.V., 2 25 mfd. 40 P.V., 1 10 mfd. 40 P.V. 1 .5 mfd. tub., 9 .1 mfd. tub., 3 .05 mfd. tub., 1 .02 mfd. tub., 1 .01 mfd. tub., 1 .002 mfd. mica, 4 .0001 mfd. mica, 1 .000035 mfd. mica.

VALVES

1 6U7G, 1 6G8G, 2 6SJ7GT, 1 6J5G, 2 807, 1 5U4G.

SPEAKER

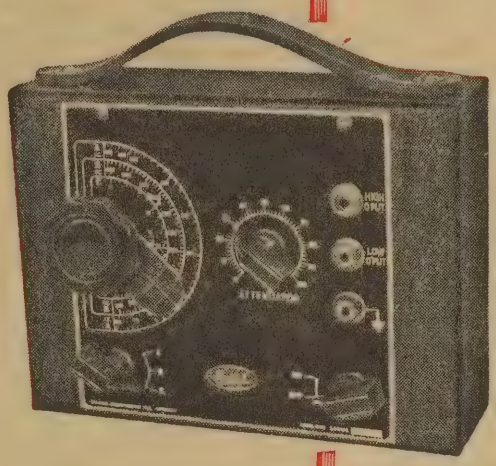
12-inch permagnetic, heavy duty.

SUNDRIES

2 insulated grid clips, 2 small grid clips, 5 knobs, power flex, hook-up wire, shielded wire, nuts and bolts, solder lugs.

# NOW AT LAST YOU CAN—

# Build Your Own Oscillator!



**Here's the kit you've waited for—an oscillator kit which covers all the fundamental frequencies necessary to line up the modern receivers.**

## EASY TO CONSTRUCT WITH ORDINARY TOOLS

The new OK1 oscillator is a simple kit which you can build at home with a few ordinary tools yet which, when completed, will give accurate and lasting service for many years. A complete book, giving pictures and wiring diagrams, and constructional details, included in every kit. The frequency ranges covered by this oscillator are in three distinctive separate bands. The A band covers 150 to 490 kilocycles, the B band covers from 550 to 1600 kilocycles, and the C band covers from 16 to 45 metres. All fundamental frequencies in the average receiver are well covered and lining up is permanent and simple.

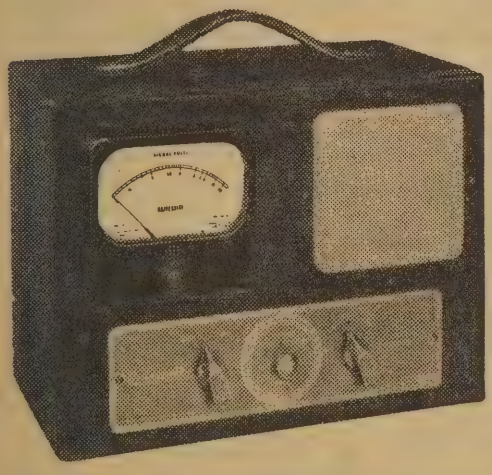
## USES STANDARD BATTERIES

"University" pioneered oscillator kits and many are still in use. Model OK1 is a companion to our famous multimeter kit model MK1 and they make a handy pair—readily portable and easily built.
The OK1 oscillator operates from built-in batteries and these batteries are standard types that may be easily purchased everywhere.

## PRE-CALIBRATED DIAL

The "University" OK1 oscillator kit comes to you with a completely calibrated dial which is pre-calibrated in the factory before going out in kit form.
This means that when you construct according to directions you have a calibrated dial off which frequencies can be read direct. Most home-builders' kits in the past have had an ordinary 0/100 dial which limited the effective use of the oscillator.
Available from all distributors, the OK1 oscillator will be in ready demand. It is available to you at a new low price with everything included, right down to the last nut and bolt. Order your model OK1 to-day!

**PRICE £7/10/0 (plus tax)**



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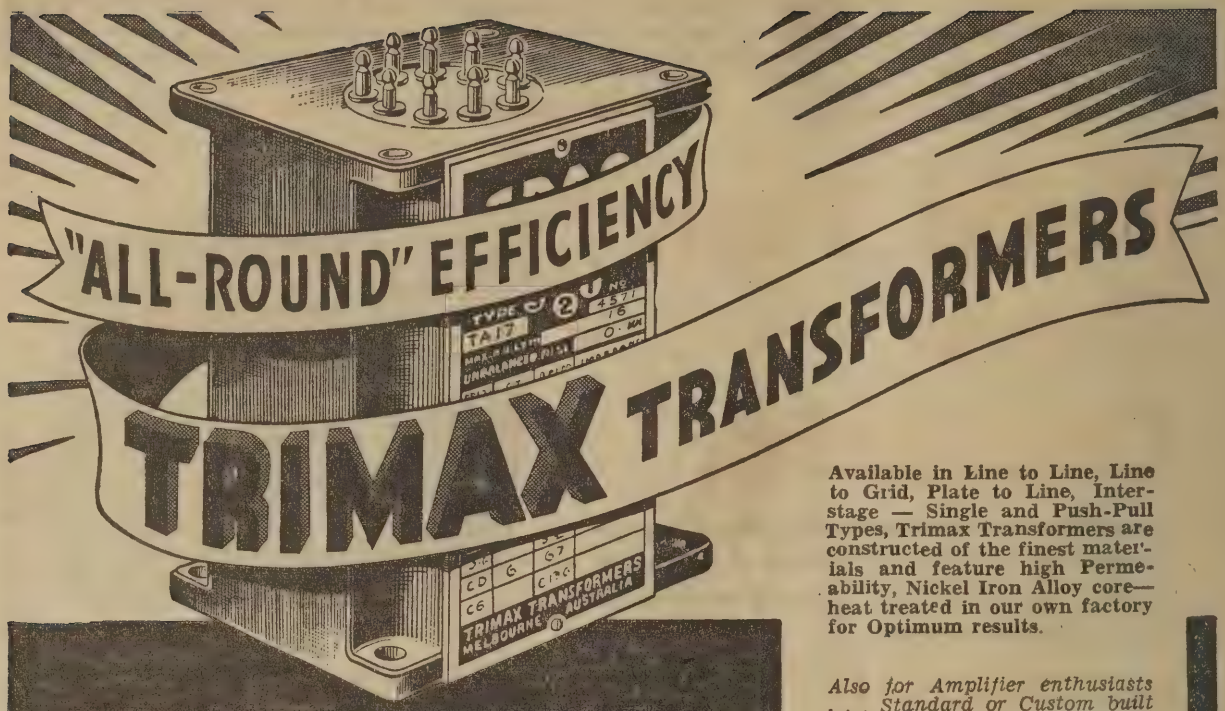


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to separate the local stations. With this in mind, selectivity may be reduced by shunting the first two tuned circuits with resistors of 0.1 megohm or less. The third tuned circuit is already loaded quite heavily by the diode detector.

Better stability at the low frequency end can alternatively be secured by the simple expedient of shielding the aerial lead wire inside the chassis, and the two plate leads of the RF amplifier valves. Shielding the leads tends to minimise stray coupling and also to shift the primary resonance further away from the low frequency limits of the band. Yet another expedient is to shunt the primary windings with resistors of a few thousand ohms.

## SHIELDING

We did none of these things in the original set, since the full selectivity was requred in the location where the receiver was tested. There was also very little trouble with instability, so that no special treatment was necessary in regard to the primary windings. A tendency to "swish," produced by regeneration on the low frequency end of the band, was overcome by keeping the grid leads to the RF amplifiers as short as possible and installing small extra metal shields between them.

These shields were cut from a humble jam tin and soldered to the gang as an extension of the shield plate between stators. You can be more fussy about this if you like. Sufficient to say that complete shielding between the gang sections and the grid wiring is desirable and you can please yourself just how elaborate you make it.

Another point is that the RF amplifier valves are deliberately overbiased with 500 ohm cathode resistors in each case. You can reduce this to 300 ohms if you want more gain, but extra care will be necessary with shielding and bypassing to preserve complete stability of operation. There is little point in using a TRF tuner for fidelity if the selectivity curve is rendered peaky and asymmetrical by undue regeneration.

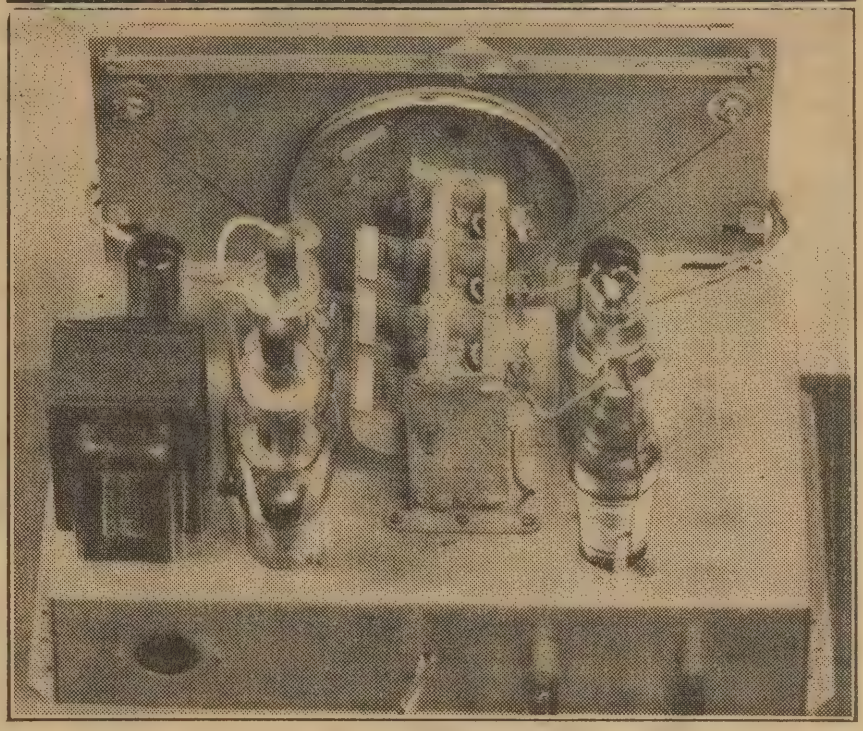
The diode detector circuit may appear rather strange at first glance, but the particular arrangement is rendered necessary by the fact that the diode load and bypass condenser cannot be connected at the earthy end of the tuned circuit. The gang stators must necessarily be earthed, which means that the low potential end of the coil must likewise be earthed or returned to it through nothing less than a .05 mfd. condenser.

## A.V.C.

In this case, both diodes are fed direct from the top of the tuned circuit through 0001 mfd. condensers. The AVC diode has its 1.0 meg. load running to earth in the usual way with a 2.0 meg. series feed resistor.

From the detector diode, the load is provided by a 0.1 meg. and a 0.25 megohm resistor in series, with a .0001 mfd. condenser bypassing the junction to earth. The 0.1 meg. resistor should be connected directly to the detector diode pin, its function being to prevent the RF filtering and audio leads from affecting the final tuned circuit.

# RADIOGRAM FROM THE REAR



A rear view of the radiogram.

The audio output is derived from the junction of the two resistors and fed through the pickup switch to the audio volume control. In the alternative position of the switch, the audio input is taken from the pickup. At the same time a second pole of the switch interrupts the screen circuit of the 6G8-G, rendering it inoperative as far as incoming radio signals are concerned.

## TONE CONTROL

The first valve in the audio system is a tone control stage which gives complete control over the bass and treble response. The very fact that two controls are involved necessitates some understanding of their purpose by the folk likely to operate the set. They should be arranged in the logical way with the treble control on the right and the bass control on the left. Turning them clockwise should increase the bass or treble, as the case may be, and counter-clockwise should diminish it.

Once the purpose of the controls is understood, you will appreciate their usefulness. For low-level listening, when other folks are in bed, the controls can be advanced and the set operated with complete satisfaction at low volume. At other times, when the receiver is operating at high volume, you can turn them well back and still preserve the same apparent balance to your ear.

Incidentally, your ear is the villain of the piece when it comes to apparent variation in balance at different volume settings. At high volume it hears plenty of bass and treble. But, when the volume is retarded, the ear tends to be most sensitive to middle frequencies.

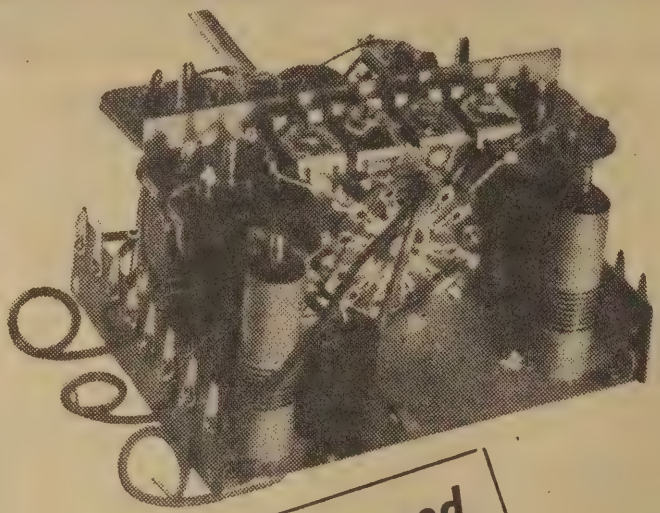
On plays, quiz sessions and so on, the combined effect of low selectivity and treble boost lends an amazing "presence" to the characters, which is further heightened if pains are taken to keep the hum level of the receiver down to an absolute minimum. As for musical programmes, the amount of treble boost you can use depends entirely on the quality of the signal source. With a set of this nature you can appreciate readily the difference between good and bad programmes.

As far as the bass is concerned, you can have it up or down at will. But don't try to pump too much bass into your loudspeaker unless it is a good one and well baffled. Otherwise your bass response will be a mere series of thumps, thoroughly unnatural and unpleasant both for you and for the speaker cone.

## OPERATION

The tone control valve itself operates as a conventional pentode amplifier, but only a fraction of its output voltage at middle frequencies is delivered to the grid of the following valve. A loss of some 17 or 18 times is occasioned by the divider comprising the 0.1 meg. resistor and the 7000 ohm resistor in series with it to ground.

The proportion of middle frequency signal passed on through the network largely determines the volume level from the receiver. The bass and treble frequencies are simply added to or subtracted from the output without affecting overmuch the general level.



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Bass compensation is controlled by the 1.0 meg. potentiometer and the associated condensers connected just above the aforementioned 7000 ohm resistor. When the potentiometer arm is in the down position (as the circuit is drawn), the .002 mfd. condenser is effectively in series with the 7000 ohm resistor as an extra and very small coupling condenser. Since the bass must reach the following grid by this path, the response is very much reduced.

## BASS BOOST

With the potentiometer in the reverse position, the .002 mfd. condenser is shorted out and another condenser is inserted in series with the 7000 ohm resistor—but this time below the feed point to the following grid. The reactance of this condenser rises at low frequencies, effectively increasing the proportion of the signal fed to the grid and thereby providing bass boost.

The treble control takes the form of another 1.0 meg. potentiometer connected directly to the plate circuit of the tone control valve. When the arm is to the left (as the circuit is drawn), the plate is bypassed to ground and a conventional treble cut action takes place. In the opposite position, the bypass is removed and the treble frequencies only are fed through a very small coupling condenser, straight to the grid of the valve. This avoids the loss in the divider network, and treble boost results.

In between the extreme settings of both controls are intermediate degrees of boost and cut, and a position where the effects balance and the response is substantially level.

Lack of space prevents a full discussion of the rest of the circuit. However, the audio amplifier proper and the power supply are almost identical to the 20-watt amplifier and to the 807 Radiogram recently described and there is therefore no need to repeat remarks which have already been made on this valve line-up.

However, see that the leads around the 807 valves are kept short and use a heavy duty output transformer mounted on the chassis.

Use 600 volt condensers on either side of the choke and, for preference, the full recommended capacitance value of 16 mfd. The condenser on the main B-plus line can be a 525PV type.

## HUM PRECAUTIONS

With a tone control stage boosting the gain at low frequencies, unusual precautions have to be taken against hum, in the provision of satisfactory filtering, the use of shielding where necessary and the choice of a good valve. The remaining point is to prevent hum due to magnetic fields from the power transformer.

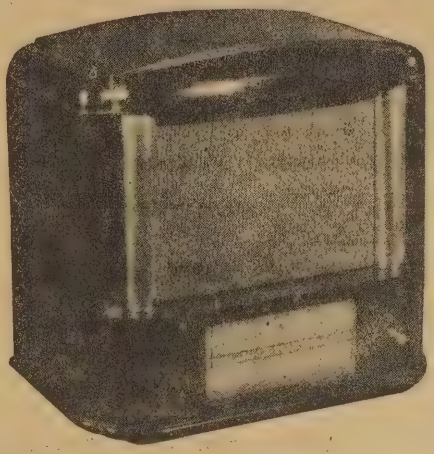
Extreme care is necessary if a set of this nature is to be built on to a single chassis and, rather than risk leading readers into trouble, we have recommended the use of two separate chasses for the job.

The power transformer, filter choke, rectifier and input filter condensers

(Continued on Page 77)


# Homecrafts

## The HOME of BETTER BARGAINS



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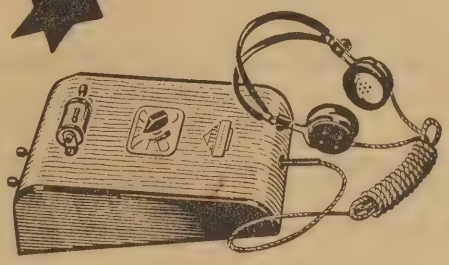

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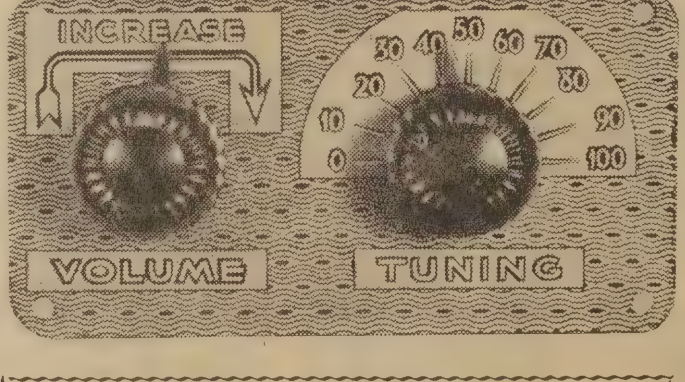
# *For Miniature Receivers*

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# SOME HINTS ON BUILDING RADIO SETS

To father and son alike, there are few hobbies more fascinating or more instructive than home radio construction. The product of their labor may be a large console radio-player or a small DX receiver, but the thrill of achievement is the same. And, what is equally important, the cost of a home-built receiver is generally much lower than that of a commercial set of the same type.

THE tools and facilities required are few. The kitchen table as a work-bench, a soldering outfit and a few other small tools which are the property of any home handyman.

It is helpful to have some idea of what radio and electricity are all about, but you need not be an expert in either subject. Read what you can about radio theory and construction, have a few chats with a friend who may know something about it, and you will pick up rudimentary knowledge of the subject in a surprisingly short while.

Nowadays the lot of the home radio constructor is made easier by articles in this and similar journals, which give detailed instructions about particular circcit designs.

Of great assistance, too, are the ready-drilled steel chassis to suit particular types of receivers. The constructor may select the other necessary parts individually or, in some cases, may be able to purchase all the necessary items in the form of a "Kit-Set."

## CHASSIS LAYOUT

One of the most important things in the design of a radio receiver is the layout of the various parts on the metal chassis. When working with a complete kit of parts, the chassis layout is usually taken care of by the designer of the kit and a ready stamped steel chassis is provided.

Should it ever be necessary for you to lay out a receiver yourself, one of the most important features to bear in mind is the fact that the grid and plate wires of all valves must be kept to a minimum length. This also applies to the wiring of the oscillator circuits in a superheterodyne receiver.

The layout must be such that each circuit, as far as possible, should be compact and isolated from all other circuits.

Another point worth watching is the location of the electrolytic condensers in a-c operated receivers. These condensers contain a paste or liquid and, if they are placed very close to the power or rectifier valve, the heat will dry up the contents and shorten the life of the condenser.

**Electrolytic condensers have a definite polarity—that is, they have a positive and a negative terminal. This must be watched carefully and the terminals connected as indicated in the circuit diagram. With the modern tubular types, the positive terminal is usually indicated by a smudge of red at the end of the condenser. With can types, the centre terminal is positive and the can itself is the negative terminal.**

In some circuits, the negative terminal connects to a point in the circuit remote from the chassis. This presents no difficulty with the tubular types. The can types, however, must be mounted with special cardboard washers fitting between them and the chassis for purposes of insulation.

Where a ready-built steel chassis is supplied, the constructor cannot readily change the layout but, in all probability, very careful consideration will have been given to the layout of the chassis in the original design. Generally speaking, standard chassis are quite efficient.

## ASSEMBLY

In assembling a receiver, the parts should all be placed in their correct positions on the chassis and securely bolted in position.

In the case of auto receivers or portable sets, it is wise to fit lock washers under the nuts of all bolts which secure parts in place. This prevents the bolts from loosening, due to vibration. For ordinary household receivers, this precaution is less important, but all bolts must be securely tightened.

In fitting the tuning condenser in position, be sure to see that it is placed in such a way that there is room for the tuning dial at the front of the chassis. Frequently it is necessary to mount the tuning condenser above the surface of the chassis by about an inch or so on long bolts.

For this reason, it is wise to mount the condenser gang in place first of all, and to make sure that it is at such a height that its shaft fits the hole provided in the tuning dial.

The shaft fitted to tuning condensers is of a standard length. In some sets it is necessary to cut a piece off the end of the shaft so that it may fit into the dial properly without the condenser having to be moved too far back on the chassis.

A hacksaw is necessary for this job, and also for cutting off the shafts of any other controls which may be too long.

Most modern tuning dials have a glass scale and, to prevent possible damage to this, it is usually wise to remove the tuning dial after the condenser gang is mounted in place. The tuning dial can then be left off until all the wiring is completed, to minimise the possibility of damage.

**In mounting IF transformers and coils, be sure to turn them around so that the leads connecting to them are made as short as possible.**

When mounting valve sockets, they should be rotated so that the plate lug on the socket is as close a possible to the following IF transformer or to the point to which it is to be connected.

Similarly the oscillator connections to the socket for the converter valve should be as near as possible to the oscillator coil.

When bolting the coils and intermediate transformers in place, it is wise to place a soldering lug under one of the bolts which secure the cans in position. By connecting all these soldering lugs together and to the earthing system, one can be certain that the cans are adequately earthed.

The soldering iron should be kept clean and well tinned A piece of rag kept handy and a scrap of sandpaper will facilitate this.

The iron should be hot enough to melt solder quite easily, but not so hot that the solder runs like water, since it will not then stay on the iron in any quantity. Furthermore, the iron will not keep clean for long if too hot.

## WIRING

The first step in wiring is to tin every soldering lug in the set to which a connection is to be made. This is accomplished by placing a very small amount of a good quality, non-corrosive flux on each soldering lug, and then rubbing on a thin layer of solder with the hot iron.

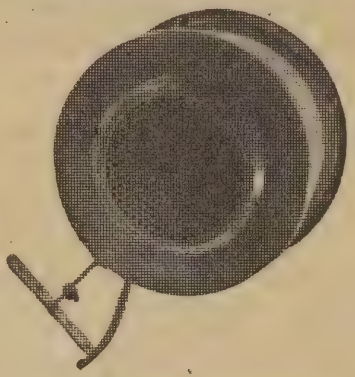
Care should be taken to see that a minimum quantity of soldering flux is employed. If a lot of flux is used, it will melt when the iron comes in contact with it and run on or into other parts, causing them to become dirty and sticky. Dust will adhere to melted flux, and this sticky layer may seriously upset the performance of the receiver.

**The very slightest smear of flux is all that is necessary.**

**(Continued on Page 35)**

WITH this article, we commence a series designed to help the radio newcomer. Those which follow will describe various radio components and quantities in simple language, devoid where possible of highly technical terms. We would like to have your suggestions for future articles, which will help us to give you what you want to read. Write to the Editor.

# This Month's SPECIAL!



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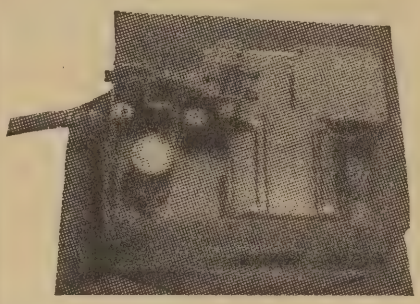
**As shown 35/- each**



Vibrator Power Supply complete with filter, 12v input, 300v output at 150 M.A. Also supplied with two 6X5GT rectifiers and one Ferrocart Vibrator cartridge.
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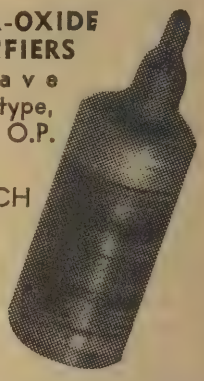

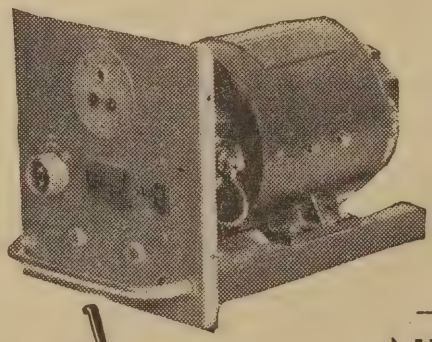

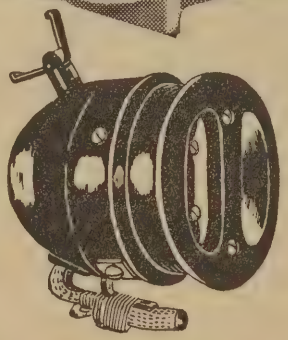

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MOUNTED IN METAL CARRYING CASE

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Suitable for Public Address, Home Broadcasting, etc.

**PRICE.....7/6**

Postage 1/- Extra

# ELECTRONIC EQUIPMENT CO.

LM3555 — 29B WEST ST., LEWISHAM N.S.W. — LM3555

# Some Hints on Building Radio Sets

(Continued from Page 33)

A system which proves very convenient in wiring is as follows:—

1. Earth wiring.
2. Filament and dial light.
3. Power supply.
4. Plate and screen grid wiring.
5. Grid wiring and any other base wiring necessary.

The small components, such as loose resistors and condensers, should then be added, and finally the power flex or battery cable.

In any circuit diagram, a number of points are indicated as being connected to earth. Some people simply connect these points to a lug bolted to the metal chassis and rely on the steel chassis joining them all together.

## EARTH POINTS

But steel chassis are always covered with duco to prevent rust, and one does not always obtain a good connection to the steel. Because of this, it is wise to join together all points indicated as being earthed, on the circuit, by means of a piece of bare 18-gauge tinned copper wire.

To make this wire neat in appearance, one end should be attached to some fixed object and the other end gripped with pliers and stretched sufficiently to draw any kinks out of it. In carrying out the earth wiring, keep the 18-gauge wire about 1/8in. from the chassis and make all bends neatly at right angles.

The filament or heater circuits of the valves, and also the dial light wiring can conveniently be carried out with ordinary hook-up wire, provided that the current in the circuit does not exceed about 4 amps.

In a-c operated receivers the two wires, which supply the filaments or heaters, should be twisted together to minimise the possibility of hum being radiated to other circuits.

In a large receiver, employing many tubes, the total heater current may exceed 4 amperes, and it is advisable to use two separate heater circuits, grouping one lot of valves together and supplying them by one pair of wires, and grouping the remaining valves so that they are supplied by means of a second pair of wires.

The dial lamps can be connected in parallel with the filaments or heaters of any of the ordinary tubes, but they should never be connected to the filament of a rectifier tube in an a-c operated set.

After completing the filament or heater wiring, the power supply, in a-c operated receivers, should be wired up. This comprises the wiring to the power transformer, electrolytic condensers, rectifier tube and loudspeaker socket.

The next step is to start at the socket of the first valve in the set and complete all the wiring excepting for the small resistors and condensers, which should be added later.

**As mentioned previously, the plate connections, grid connections and also the connections to the oscillator section of the converter valve, should be kept as short as possible by running the wiring direct from point to point.**

The wiring of the screen, cathode and other circuits is not critical, as far as length is concerned, and it is better to keep the wires parallel, with all bends neatly made at right angles, in order to improve the appearance of the set.

After carrying out as much wiring as possible to each of the sockets, you should commence to fit in the small resistors, condensers, and other loose parts. The "pigtail" wires, which are fitted to these resistors and condensers, should be cut to length as necessary, and the part placed as close as possible to the points to which it connects. Short circuits can be prevented by covering the bare pigtails with a short length of spaghetti tubing.

## CONDENSERS

One end of all tubular condensers is usually marked "earth end" or "outside foil." This end in particular should be connected to the earth wiring of the set where such a connection is called for.

Electrolytic type condensers have a positive and negative end, and care should always be taken to see that the end which is marked positive or is colored red connects to the positive side of the circuit.

Any remaining wiring should then be carried out, and the power flex or battery cable should be added last of all.

When the wiring is completed it should be thoroughly checked. Every wire and every connection in the set should be traced through from the circuit diagram. It is a good plan to mark off in pencil each connection on the circuit as it is found in the receiver.

## TESTING

Turn on the power to an a-c receiver or connect the batteries to a battery-operated set, and check the filament voltage at each socket before inserting any valve.

The filament voltage can be checked by means of an ordinary dial lamp or a voltmeter. The approximate voltage can be estimated by the brilliance with which a dial lamp lights. If the voltages appear to be in order, switch off again, connect a loudspeaker, and then plug in the valves.

With a mains operated receiver, watch the rectifier valve very carefully as you switch on the power. A momentary blue glow between filament and the plates may be caused by the forming and charging current of the electrolytic condensers, and is of no consequence.

However, if the blue glow persists, or if there is any sign of flashing over within the electrode structure of the rectifier, a short-circuit is indicated in the high tension wiring. Switch off immediately, and do not reconnect the power until the trouble has been located and rectified.

If a voltmeter is available, check the voltage applied to the filaments, the plates, screens, and any other valve elements. If the set contains a voltage divider, the clips on this unit can then be adjusted.

You can roughly align the receiver by adjusting the intermediate transformers, the gang trimmers, and the padding condenser for maximum noise level or for loudest signals from broadcasting stations. There is definite procedure to follow, as usually set out in descriptive articles.

This is, of course, only a very rough method of alignment, and, to obtain maximum performance from the receiver, it should be carefully and accurately aligned by means of a modulated oscillator and output meter.

If a receiver will not operate after it has been constructed, the trouble may be due either to a mistake in the wiring or to a faulty component. If the circuit has been thoroughly checked, and there are apparently no mistakes in the wiring, it is best to start and test each component individually until the defective one is found.

Oscillation, which usually takes the form of squealing and whistling whenever a station is tuned in, is generally caused either by long wires, loose or missing shields, or inefficient bypassing.

If your set oscillates, firstly carefully examine the layout of the set or wiring, with the object of making the plate, grid and oscillator circuit wiring as short as possible. Sometimes shortening one of the plates or grid wires by an inch or so will cure oscillation.

All valves which handle radio frequency signals should be shielded by means of an aluminium can, if they are not already provided with a metallic coating. For efficient shielding, the aluminium can should completely enclose the top of the valve, so that the grid connection is covered.

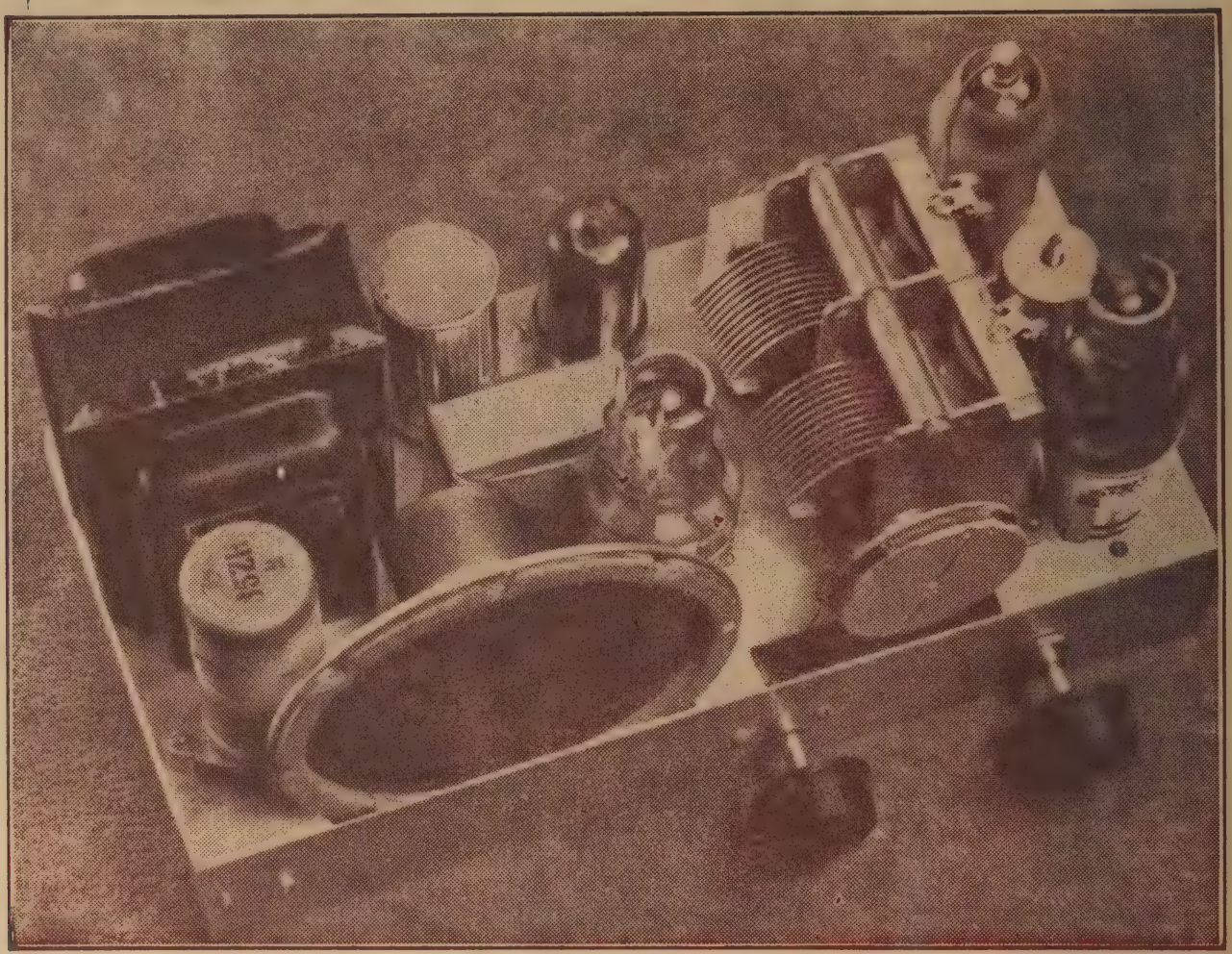
In some sets it is not necessary to shield all valves handling R.F. signals, but in superheterodyne type receivers, it is usually essential to shield the I.F. amplifier, and if oscillation is experienced, a shield over some or all of the other R.F. tubes frequently cures the trouble.

## EXTRA CONDENSERS

In many cases, oscillation is cured by connecting a tubular condenser of .1 or .5 mfd capacity from a screen, cathode, or the B plus circuit to earth. It is advisable to try the condenser from every possible point in the receiver to earth, and quite likely one point will be found where the condenser cures the trouble.

In some circuits, the capacity of the condenser connected from the plate of the detector valve to earth is insufficient, and a larger capacity in this position frequently effects an improvement.

If you obtain a good circuit and good quality parts in the first place, and observe the simple hints contained in this article, you should be quite capable of building a really first-class receiver.



In appearance, the set looks like any average mantel, except for the slightly larger power transformer and addition of the vibrator.

# THE 6-240 MANTEL SET

Here is a design with an important difference. Externally the "Six-240" is a snappy little mantel receiver with a margin of power and gain over most others of its type. But you can take this set along with you in the car or on a country vacation. Plug in another power cord, flick a switch and it operates just as happily from a 6-volt accumulator.

by W. N. Williams

THIS new set fills a gap which we feel has existed for a long time. We all like to take a radio on vacation, but not everyone can afford a regular portable or an auto set. And, for obvious reasons, neither of these sets can be used in the home. Most of the time they are stowed away in the garage or in a cupboard.

## THE DESIGN

Hence the thought: Let's design a small set which will operate normally as a mantel receiver. Mains type valves for simplicity and reliability, no batteries to run down, no attachments to get in the way. In fact, it would have to be just as neat and just as attractive as any other mantel receiver.

For alternative operation, it would need its own built-in vibrator supply, so that it could be hooked to the car accumulator or to a separate battery and operate with the same ease and convenience — again without bulky attachments. At least, that's how the idea appealed to us. It's a rather new approach to a problem, and we feel that there are plenty of readers who will say: "That's just the idea we've been waiting for."

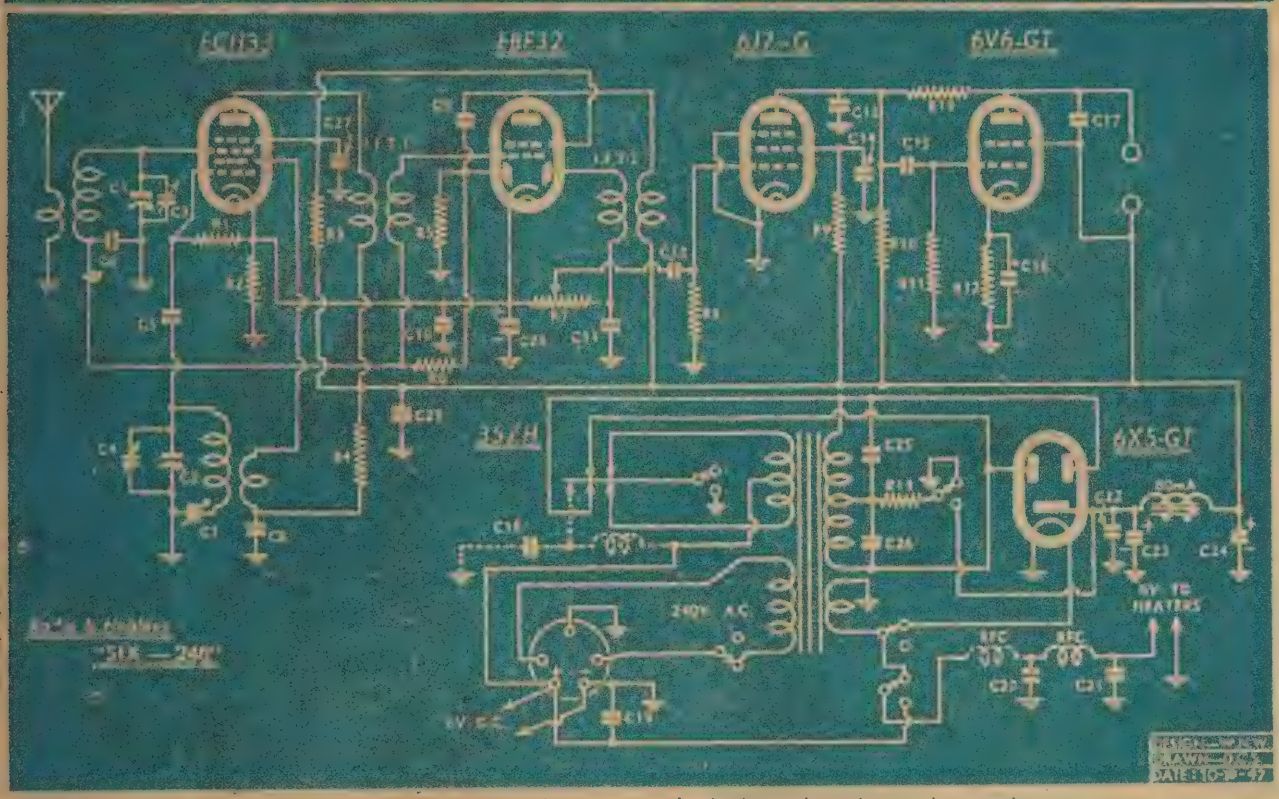
Of course, there is one catch to it, namely, the battery drain. Depending on the valves used, it is likely to get up over the 3-amp mark, which is more than could be tolerated for a regular domestic installation. But this isn't quite the same thing. Occasional periods of operation at this current will not overwhelm the ordinary car battery. And it is nice to be able to perch the set on the running-board and have music while you eat.

## FEATURES

And, for a country holiday, the expense of hiring or recharging an accumulator for a few days is trifling.

Having decided on the basic requirements, the general design followed as a matter of course. It had to be small but sensitive, so that the obvious

# A RECEIVER FOR MAINS AND VIBRATOR WORK




Note how the same power transformer serves for both 6 volt and 240 volt operation.

choice was a four-valve superhet, plus power supply—five valves in all—converter, IF amplifier and detector, audio and an output stage.

This part of the circuit requires very little comment. The converter suggested is an ECH33, which was announced for Australian distribution just recently. It is electrically identical to the popular ECH35, but has a 6.3 volt 0.2 amp heater. The saving in heater current is worth while, especially if a similar saving can be made in other stages.

There are limited supplies of the ECH33, but you can use as an alternative the ECH35 with no change to the circuit constants. The only drawback, as we mentioned, would be an extra 0.1 amp of heater drain.

## VALVE TYPES

An interesting possibility is the 6D8-G, which has a 0.15 heater, but electrical characteristics substantially similar to those of the 6A8-G and the 6J8-G. For these types, the oscillator anode resistor would need to be reduced from 40,000 ohms to 20,000 ohms.

For the 6K8-G, the screen and oscillator anode and screen resistors would be, respectively, 20,000 and 40,000 ohms. The only other converter likely to be of interest is the EK2-G, which requires a screen supply voltage of 50.

Best choice for the IF amplifier is the EBF32 or EBF2-G, which gives high gain and has a 0.2 amp heater. However, it is in rather uncertain supply just now, and you may be obliged to use a 6G8-G, as in the original receiver. No changes in the electrical circuit are involved.

## PARTS LIST

### AND KEY TO CIRCUIT

1 Chassis, 11½ x 5½ x 2¼ inches.
1 Power transformer, 240V. & 6V. Vib. prim., 250-0-250 & 6.3V. secondaries, 150-60mA.
1 5-inch permag. loudspeaker, with 5000-7000 ohm trans.
1 60 mA. filter choke.
3 Valve shields.
1 Miniature aerial coil.
1 Miniature oscillator coil.
2 I.F. transformers, 455 kc.
1 Tuning dial, Efco MK-17A or similar.
1 Single-bank, 2-position 6-pole rotary switch.
1 5-pin plug.
2 5-pin sockets with protective caps.
5 Octal sockets, 1 6-pin.
2 Terminals.
2 Control knobs, 1 pointer knob.
1 Synchronous vibrator cartridge, Oak 35ZH or similar.
1 ECH33 valve, 1 EBF32, 1 6J7-G, 1 6X5-GT, 1 6V6-GT (see text).

### CONDENSERS

C1, C2 Sections of 410 mmfd. 2-gang
C3, C4 30 (approx.) mmfd. trimmers
C5 .00005 mfd. mica.
C6 .05 mfd. tubular.
C7 410 mmfd. mica or 455 kc. variable padder.
C8 0.1 mfd. tubular.
C9 .0001 mfd. tubular.
C10 0.1 mfd tubular.
C11 .00025 mfd. mica.
C12 .01 mfd. tubular.
C13 .0001 mfd. mica.
C14 0.1 mfd. tubular.
C15 .05 mfd. tubular.
C16 10 mfd. electrolytic, 40 PV.
C17 .001 mfd. mica.
C18 .001 mfd mica.
C19 0.5 mfd. tubular, 200V.
C20 0.1 mfd. tubular, 200V.
C21 .005 mfd. mica.
C22 .001 mfd. mica.
C23, C24 8 mfd. 525PV. electrolytics.
C25, C26 .02 mfd. 600V. mica or tubular.
C27 0.1 mfd tubular.
C28 10 mfd electrolytic, 40 PV.
C29 0.1 mfd tubular.

### RESISTORS

R1 50,000 ohm.
R2 150 ohm.
R3 35,000 ohm.
R4 40,000 ohm.
R5, R6 1.0 megohm.
R7 0.5 megohm potentiometer.
R8 10 megohm.
R9 1.5 megohm.
R10 0.25 megohm.
R11 0.5 megohm.
R12 400 ohm.
R13 2.0 megohm.
R14 100 ohm.

### SUNDRIES

Scrap aluminium for bracket, nuts, screws, washers, solder lugs, hook-up wire, spaghetti, shielded wire

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Capacity:—399pF's.
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Constructed on low-loss ceramic base with brass vanes soldered to supports and electroplated. Brass rotor shaft on steel ball bearings.

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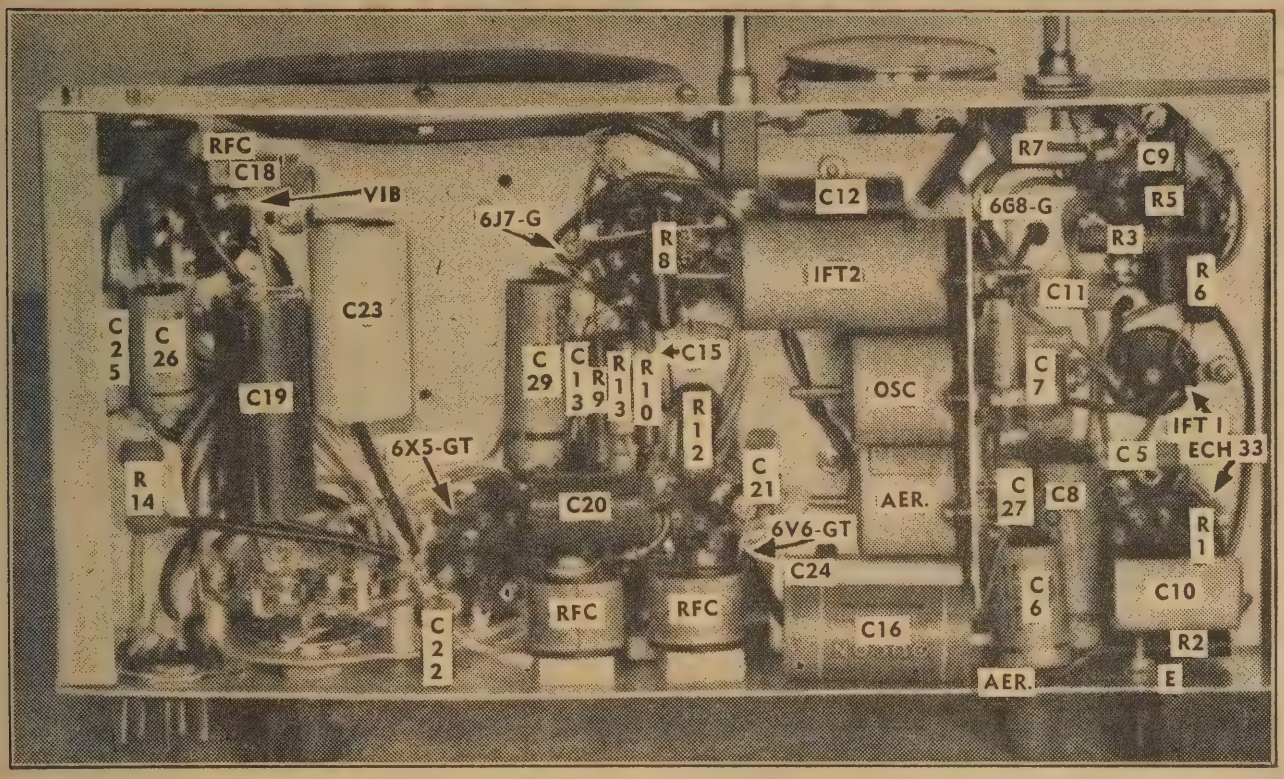
# THIS PHOTOGRAPH SHOWS PLACEMENT OF PARTS




This photograph shows the exact position of all the wiring parts in the original set. Note that there is a clear space between C23 and C29 for the insertion of a shield panel. Two low resistance R.F. chokes are mounted clear of the rear of the chassis and connected in series with the heater wiring of the first four valves. In some cases only one of these will be required. Some interference was apparant from the driving coil and contacts of the particular vibrator cartridge used and an additional R.F. choke and the condenser C18 are seen in the upper left-hand corner of the picture. The components may not be required in all cases and are consequently shown dotted in the main circuit diagram. 11 R.F. chokes must be of the low resistance variety, wound with heavy gauge wire. Note the five-pin power plug mounted on the rear of the chassis alongside the AC-DC switch. Miniature tuning coils are to be preferred in this set since they allow more space around the 6V6GT socket. It is also helpful to use miniature I.F. transformers which are now available on the market from at least three manufacturers. Note how the entire tuning system is grouped between the coil bracket and the end of the chassis, while power supply components are together at the other end. The relatively unimportant components in the audio circuit occupy the central space.

The audio voltage amplifier can be either the 6J7-G or the 6SJ7. But use a 6W7-G if you are lucky enough to obtain one, as it has the lighter 0.15 amp heater. Base connections and characteristics are the same as for the 6J7-G.

For the final stage, the 6V6–GT combines good efficiency and power output with a relatively low heater drain of 0.45 amp. It is thus a better choice than the 6F6-G, which requires 0.7 amp for no increase in performance. However, the 6K6-G or the older 41 are both suitable types to use, having much the same heater current as the 6V6-GT and requiring no alteration to the electrical circuit.

## THE CHASSIS

It is worth noting in passing that the current rating of the various valves is for an applied voltage of 6.3. When the voltage is reduced to something less than six volts, due to the internal resistance of the battery, the leads and the filter system, the current is reduced proportionately, which is all to the good.

Leaving for a moment the matter of the electrical circuit, it was clear that we had to design a new chassis layout for the job. The nearest standard chassis was the "Fireside Five," but it is not quite suitable, and is also larger than we really wanted. The new one had to be small enough to qualify as a mantel set and easily transportable. So, much as we dislike adding to the already imposing list of chassis plans, we felt obliged to make a special job of this one.

Fortunately, the institution of our blueprint service helps materially in this matter, since it is no longer necessary to rely on someone's memory for the chassis layout of any particular receiver. Our blueprints show the exact size of the chassis and the position of all holes and cutouts.

## LAYOUT

In laying out the new chassis, we evolved what we feel to be one of the neatest arrangements to date.

The usual plan is to instal all vibrator supply components in a self-contained metal box, which is then mounted on the main chassis and connected to it only at one point. This is the most reliable approach, but it is unfortunately not one which can readily be adapted to the requirements of a mantel-size chassis. The only alternative is to adopt a more conventional layout arrangement, but to locate the parts in a way which will ensure the maximum separation between the power supply and signal circuits.

Accordingly, the gang condenser is mounted to the right of the chassis, with just enough room for the valves to mount between the rear of the gang and the edge of the chassis. The first I.F. transformer mounts between them, while the second I.F. transformer and the two coils mount on a bracket beneath the chassis. The coil cans and the bracket consequently present a formidable barrier of metal between the power supply components beneath the chassis and the wiring of the tuner. The effect is further increased by the fact that the diodes are in the same valve envelope as the I.F. amplifier.

Tracing the wiring through, the aerial lead comes from the terminal, straight across to the appropriate pin of the aerial coil. The grid lead passes straight up through the chassis to the rear stator of the tuning gang,

(Continued on Page 43)

# POSITIVELY LAST RELEASE BY ARMY

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**Radio Set Builders:**
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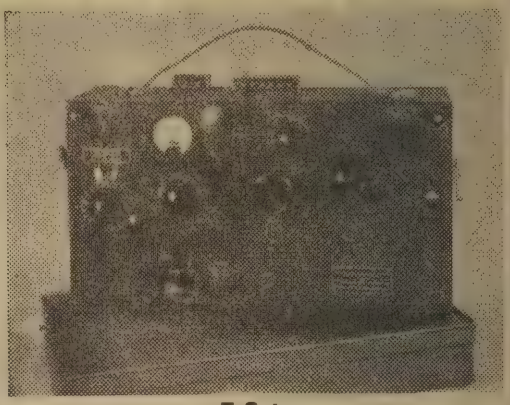

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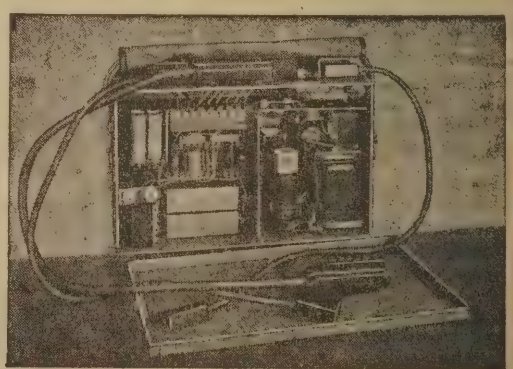

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**Brand new ROTARY TRANSFORMERS**

Made by A.W.A. 275-V. Output 110 ma. 500-V output 50 ma. 12-V input. These make perfect power supplies for truck amplifiers, car radio, outdoor transmitters or any job requiring high voltage.

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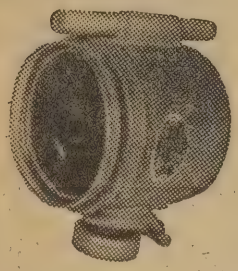

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**Multi Meter**

0-10 Mill.,
0-50 Mill.,
0.250 Mill.
1250 Volt.

**32/6 each.**

**Excellent Telephones**

Made by S.T.C. Easy to install. Cost £12/12/-

**£2/16/-**

**SPECIAL! SPECIAL!**

6 Valve

**WALKIE TALKIES**

containing Coils, IF Trans. Sockets, 2 Single Gang Conds. 1—3 Gang Cond. and Vernier Dials. Switches, RF Chokes. All necessary Resistances & fixed Cond. & 0-10 Mill. Meter.

**Can never be repeated . . . 32/6 each.**

*Headphones and Microphones 19/- extra.*

**METER RECTIFIER BOX**

containing 0-5 M/A. Full Wave Rectifier 0-1 Half Wave. 0-1 Full Wave Rectifiers.

**10/- each**

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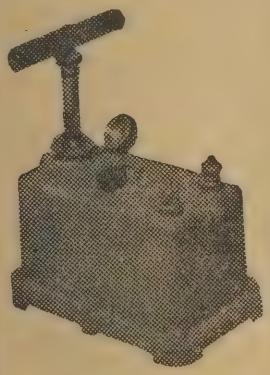
**FAMOUS COMMANDO TORCH only 2¼" long.**



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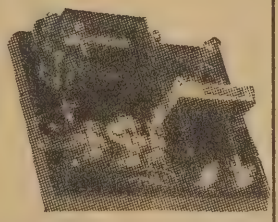
COST
**£18/-/-**

BRAND NEW
**37/6**

Brand New Army

**KEY AND BUZZER**

10/6



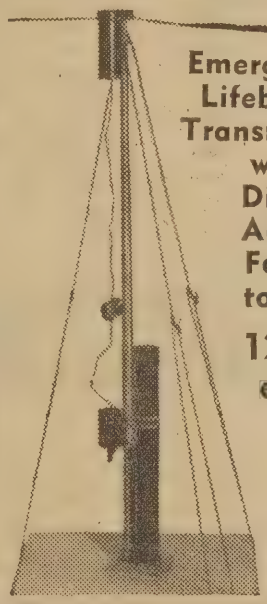
0/14v., 0/250v. double reading Meter. 1000 ohms per v. . . . . 14/6

Excellent carrying case for same . . . . . 2/6

**12 Volt. 50 Amps. CHARGING GENERATOR. Brand New**

Attach to any Farm Plant for Battery Charging or 12 Volt Home Lighting. Cost £70.

**£10/10/- each.**



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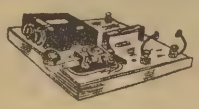

## P.M.G.
## Adjustable Morse Keys

We have made another purchase of these brand new, genuine P.M.G. Adjustable Morse Keys and we are now able to sell them at the ridiculously low price of 10/- each.

P.M.G. MORSE KEY .. **10/- ea**
(Without Headphones).

P.M.G. MORSE KEY. With brand new Stromberg-Carlson headphones .. .. .. .. .. .. **19/6**

PLEASE NOTE: These Morse Keys are brand new, ex-Army, and not military rejects.

## REFLECTOR GUNSIGHTS

Ex-Air Force. Containing best quality condenser lenses and adjustable reflector. Parts can be used for many purposes. .. **£2/10/- ea**
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COMPONENTS INCLUDE THESE VALUABLE LENSES

1 2 3 4 5 6

No. 1 Diam. 3 5-8 Foc. Len. 10in. No. 2. Diam. 3¾ Hollow Ground. No. 3 Diam. 3¼ Foc. Length 4½in.+. No. 4 Diam. 2 3-8 Foc. Length 6½ in.+. No. 5 Diam. 1 1-8. No. 6 Diam. 1 1-8 Amber Coloured ordinary.

Gent.'s renovated Pocket watches, nickel and rolled gold—7 and 15-jewels. Fully guaranteed. PRICE **£2/10/- & £4/15/-**
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Push-type grease guns, ex-Army. 5oz. Slightly used; perfect order. 12/6 each. 10oz., slightly used; perfect order, 15/- each. 10oz. new, £1 each.
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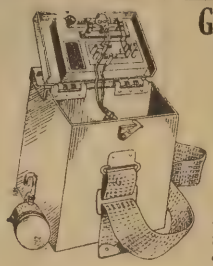
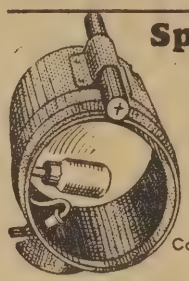


## Genuine P.M.G. Morse Key, with Light

Complete with Steel Carrying Box, 8in. x 8½ x 7. Worth at least £6/10/-. With carrying strap.

**Our Price .... 11/6**

The Carrying Case, which is complete with shoulder strap, alone is worth the money, or together with spotlight 29/-. Freight 4/- (NSW); Interstate F.O.R.



## Spot Light

Ideal for fishing, hunting, shooting. Brand new. Original cost £2/15/- each.

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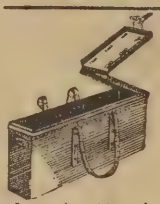
Complete with Stand.
Freight 3/-.



## METAL TOOL BOX, 3/11 ea.

3¾. wide, 7in. deep, 15in. long. Ideal for carrying spanners, pliers, hammers, etc. Opens at top and has leather grip handle. Cost the Army 15/- each. Brand new. Out they go for 3/11 each. Post, N.S.W., 2/- extra; Interstate 3/6 extra.

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Genuine mercury line Armour clad. The Thermometer with a 1001 uses. Brand New ex-Army.

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Ex-RAF, brand new. Ideal for fishing, etc., original cost to RAF £15. Price now complete with sea anchor, paddles etc.

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## SPECIAL TOOL OFFER

Our Offer this time includes Spanners that have been unprocurable for the past seven years.

1 RING OPEN END 9-16 MAGNETO SET SPANNERS
9/32 x 5/16, 2BA x 4BA, 0BA x 1BA, 6BA x 6BA, 3/8 x 11/32, 13/64 x 15/64, 7/32 x 1/4, 5/16 x 9/32, 4BA x 2BA, (Pein) 1 2lb. BALL PEIN HAMMER £1/14/6) One Metal Box 3¾in. x 7in. Deep 15in. Long

**The lot for £1/14/6**

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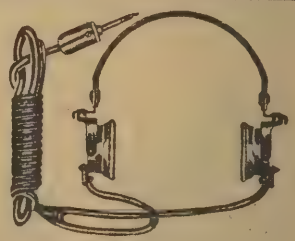

## HEADPHONES

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2000 ohms impedance .. .. **£1**

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Now .. .. .. .. .. .. **£2/17/6**
Postage 3/6 extra.

No C.O.D.

# DEITCH BROS
**210a George Street, Sydney.**

(Continued from Page 39.)

and thence to the grid cap of the converter valve. The oscillator leads are likewise very short.

The plate of the converter feeds straight to the plate pin of the first I.F. transformer, while the grid lead of the I.F. amplifier passes up through the chassis to the grid cap of the valve.

The particular type of I.F. transformer used has no provision for a lead out the top of the can, but has been designed with an eye to single-ended valves.

## I.F. PLATE CONNECTIONS

The plate of the I.F. amplifier feeds across to the second I.F. transformer, mounted beneath the chassis, while the secondary connects back to the diode pins of the same valve. The volume control, forming the diode load, is close by, so that the whole circuit can be wired up with leads no more than an inch or so long, and without the need for shielded cable. Rather, the only shielded wire necessary in the whole of the tuner system is the audio lead, which goes across to the grid cap of the 6J7-G.

The entire tuner is, therefore, contained within the narrow channel between the end of the chassis and the coil bracket.

The 6J7-G audio amplifier is mounted centrally on the chassis, alongside the front section of the tuning gang. The 6V6-G is behind it at the rear of the chassis, while the output transformer tucks away nicely behind the tuning gang. The placement of the output valve and rectifier at the rear of the chassis allows the heat to be dissipated without affecting the cabinet or any of the other components.

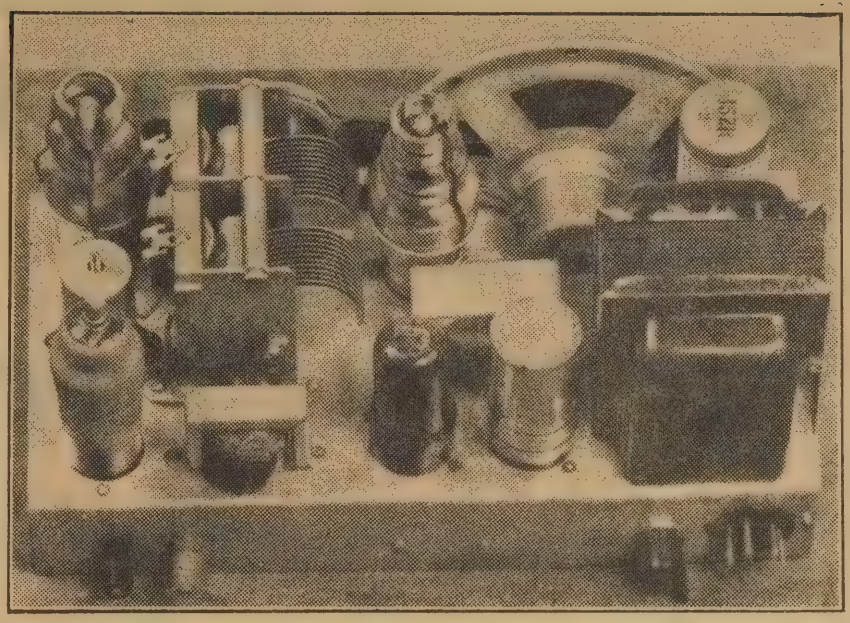
The power transformer is in the rear corner of the chassis, filter choke alongside it, speaker in front, while the vibrator cartridge is tucked away in the extreme corner of the chassis, where it is least likely to cause harm.

## POWER TRANSFORMER

At first glance, the power transformer is a rather bulky affair, but this is easily explained in the light of requirements. It has to run a regular 4/5 valve mantel receiver, so that the same windings are required as of any other light duty power transformer. But, in addition, it has to include a generously proportioned centre-tapped primary for vibrator operation.

The manufacturers of the original transformer were not keen to economise in core dimensions, as they naturally wanted to preserve good efficiency. With too small a core and finer gauge wire, the efficiency could easily drop to 40 or 50 per cent., making the receiver a very poor proposition on vibrator power. Another important point is that the transformer must employ vertical shielded construction to ensure freedom from vibrator hash.

Power is fed to the receiver through a regular 5-pin plug and socket, the male portion being mounted on the chassis. Don't reverse this, or you will have bare 240 volts protruding from the end of a 5-pin plug. Two of the pins are for the power mains connection, two for the battery connection, while the fifth pin is an earth connection.



A further view of the receiver.

Two power cords, therefore, have to be made up, one terminating in a suitable mains type fitting and the other in spring clips for connection to a battery. And don't forget to mark the polarity of the clips or you will be feeding voltage in reverse to your filter condensers.

## AC-DC SWITCH

An ac-dc switch is also mounted on the rear of the chassis, serving to change the circuits over for battery or mains operation. It is so connected up that no harm can result if you plug either cord in with the switch in the wrong position. A most important point, if we may so so!

The switch is actually a single bank two-way six-pole affair, as will be seen from the photographs. We have drawn it as a series of single switches in the circuit, just to avoid having a hopeless tangle of wires radiating from the one switch bank. You will have to allow for this and think carefully as the various connections are made to it.

The switch has been drawn with all contacts in the a-c position. Tracing the circuit through, you will note that one section closes the circuit to the 240-volt primary, while another connects the heaters of the four valves to the 6.3 volt winding. Still another section connects the heater of the 6X5-GT rectifier to the same winding, so that it comes into operation for a-c supply.

The centre-tap of the high tension secondary is returned to earth, while the remaining contact breaks the junction between the vibrator reed and earth, preventing the cartridge from being affected by the 50-cycle voltage.

There is one difficult point about this; in that the metal shell is also connected to the reed in most types. We used a 35ZH cartridge, with a separate driving contact, and the reed in this does not normally rest against any of the other contacts. Thus, it is merely necessary, when mounting the cartridge, to make sure that the shell does not touch any metal part of the chassis, or will not bear down against the socket ring or bolts.

## VIBRATOR INSULATION

We mounted the socket above the chassis and slipped a cardboard ring between the base of the cartridge and the socket. Incidentally, it was not found necessary to spring mount the socket, although some vibrators are worse than others in the matter of mechanical hum.

Complication arises if you have to use a vibrator in which the reed normally lies against one set of contacts. In such a case, the full transformer secondary voltage appears on the vibrator cartridge—not necessarily dangerous, but enough to give you a very unpleasant shock. So one of two precautions are necessary. Either you will have to make up a cardboard sleeve to slip over the bare metal cartridge, or you will have to wire the spare section on your switch to break to particularly secondary connection which is causing the trouble.

We prefer the first method, if only to avoid having more than the necessary amount of wire attached to the transformer secondary. Every extra inch of lead is a potential radiator of interference.

## 6X5-GT CIRCUIT

Anyway, with the switch in the ac position, the connections are quite usual for an ac receiver, and you should have no difficulty in understanding the operation of the circuit.

(Continued on Page 47)

# MORE "Q PLUS"

## AT LAST ! ! MIDGET I.F.'S

- SIZE ¾" x ¾" x 1⅞".
- NEGATIVE TEMPERATURE. CO-EFFICIENT CERAMICON CONDENSER.
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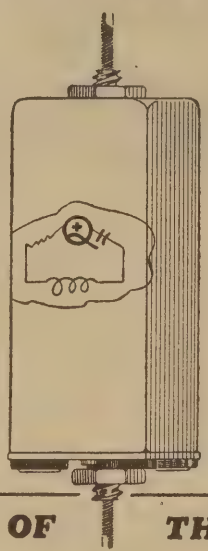

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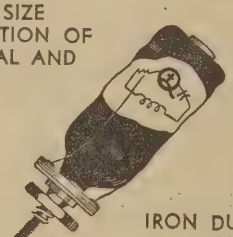
***ACTUAL SIZE DRAWING OF THE "Q PLUS" MIDGET IF's***

ACTUAL SIZE ILLUSTRATION OF THE AERIAL AND R.F. COILS



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## Midget Aerial & R.F. Coils

- PERMEABILITY TUNED
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- MATCHES "H" GANG
- MAY BE MOUNTED ANYWHERE
- AVAILABLE AS AERIAL COIL
  " " R.F. COIL
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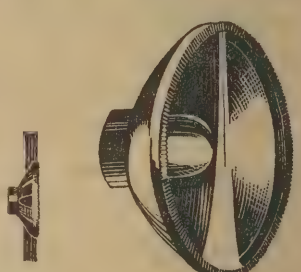
- RETAIL PRICE, ea. .... .... .... 6/11

## JUST A KNOB ! !

**BUT ! !**

Illustrating How Knob appears In Cabinet



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ESPECIALLY DESIGNED FOR PERSONAL PORTABLES—OTHER TYPES TOO—THIS KNOB FITS FLUSH WITH THE CABINET, THUS PREVENTING DETUNING BY KNOCKS, ETC. AND ALSO SAVING SPACE.

AVAILABLE IN ATTRACTIVE PASTEL SHADES.
ALSO BLACK OR WHITE, ea. .... 1/3

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THIS GRAND LITTLE PERFORMER IS NOW AVAILABLE IN EVER INCREASING SUPPLIES AND HAS THESE GRAND FEATURES:—

- "Q PLUS" COILS & .IF.'s.
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- CARRYING STRAP ACTS AS AERIAL WITH THE LOOP.
- ROLA 3C SPEAKER.
- SIZE ONLY $6\frac{1}{4}$" x $4\frac{3}{8}$" x $4\frac{5}{8}$".
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- COMPLETE WIRING INSTRUCTIONS, HARDWARE, EVEN SCREWS, ETC.

**Available as a foundation kit which includes: Cabinet, chassis, coils, I.F.'s hardware, wire, instructions, etc. .... £3/17/6**

**Or as the complete kit with all the above, plus speaker, valves, batteries, knobs, resistors, condensers, etc., etc., ... £13/3/6**

## BUILD IT FOR CHRISTMAS—THE $3\frac{3}{4}$ POUNDER

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**and**

**"Q PLUS" MIDGET 1R5 OSCILLATOR COIL .. .. .. .. .. .. 4/9**

*"Q Plus" Coils are available from all good radio stores*

**R. W. STEANE & CO. PTY. LTD. KEW VIC.**

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Brand new army type low impedance with cord, headband and plug.

**7/6**

Post 1/- extra

## NAVY MAGNETIC SET

Consists of sensitive double headset and microphone. Postage 1/3 extra. **25/-**

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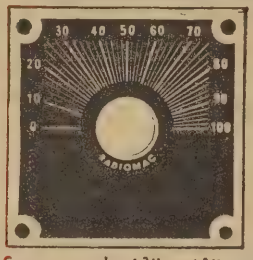
As illustrated Complete with cord and plug **7/6** postage 9d.

***New arrivals added to our extensive range of quality parts***

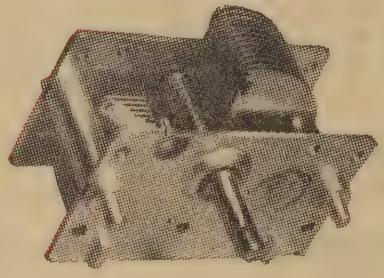
## RADIOMAC Condenser Scales




**1/-**

Square scale 1¾" x 1¾", nickel on black. Marked 0-100 for condenser.

## Single Gang Condensers



A compact 385 mmt condenser for all small sets. Post 6d extra. **8/6**

## English Toggle Switches

Best quality nickel-plated finish Single Pole - - **3/3**

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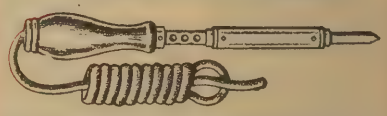

Best quality nickel-plated with cord and plug. 60 or 75 watt . . . . . **24/6**

## METER RECTIFIERS

Westinghouse fullwave type for AC readings on multimeter . . . . . **32/-**

## PHONE JACKS

Midget type for standard plug.

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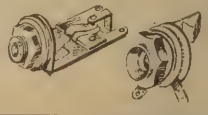

Closed Circuit **2/-**

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HEAVY DUTY TYPES (Not Illus.)
2, 4 or 6 pin . . . . . 5/-.
12 or 18 pin . . . . . 7/6.

**MAIL ORDERS ——— ——— 24 HOUR DESPATCH**

# PRICE'S RADIO

## 5 & 6 ANGEL PLACE, SYDNEY

***Radio Component Specialists For Over 25 Years***

(Continued from Page 43)

With the switch in the opposite position, the power mains connection is broken, so that no damage can occur, even if the power switch is still on. At the same time, the heaters of the first four valves are transferred to the 6-volt supply and the heater circuit of the 6X5-GT opened up altogether. Thus, although this valve is still partly in circuit, the vibrator cartridge itself rectifies the output from the transformer. The arrangement complicates the wiring but saves the 0.6 amp heater current of the 6X5-GT.

Other sections of the switch transfer the high tension centre-tap from earth to the dc output circuit and earth the reed of the vibrator, allowing it to operate. Don't forget, when wiring the receiver, that the leads to the vibrator cartridge have to be phased by trial and error to see that the output is positive with respect to chassis. If it happens to be negative, reversing either the primary or the secondary contacts will do the trick. Thereafter, the correct connections must always be made to the accumulator.

## ON-OFF SWITCH

Happily enough, the ac-dc switch also acts as an off-on switch, since turning to the alternative position with either method of supply renders the receiver completely inoperative. Readers familiar with vibrator set technique will have no difficulty in tracing out the circuit for vibrator operation. The only real complication is in the switching arrangements from one mode of operation to the other.

Unfortunately, in the time available we could not tackle the job of drawing a complete wiring diagram, helpful though such a diagram would be for beginners. On the other hand, we scarcely advise beginners to build a vibrator set of this type, for they are more tricky by far than either a straight battery or ac set. If you can't read a schematic circuit diagram, don't rush into the construction of this set without at least a technical adviser at your elbow.

As with all vibrator sets the chief problem in this case is to exclude vibrator hash from the input circuits. The measures to accomplish this involve shielding, filtering and careful arrangement of connecting leads.

## ACCUMULATOR LEADS

Connection to the accumulator is made via the same 5-pin plug as is used for the 240-volt leads. The leads to the accumulator should be in heavy twin flex, no longer than necessary and terminated by two large spring clamps. Some interference may be radiated from this lead so that it is wise to shield it over the first 18 inches or so adjacent to the chassis. The necessary large diameter braiding can be obtained from coaxial cable or some of the other multi-core cables available from Disposals equipment. Earth the shield cable via the spare pin to a point just inside the chassis.

The negative battery lead should be taken to an earth point centrally placed on the chassis between the plug and vibrator cartridge. The positive lead can be taken across to an adjacent point on the ac-dc switch and the 0.5 mfd bypass connected directly between these two points.

The lead to the 6-volt primary winding and to the driving coil on the vibrator cartridge should be taken from this common point while another lead goes to the first of the heater chokes. It is quite important in practice not to have lengths of lead inside the chassis common to the vibrator and heater circuits.

## L.T. CHOKES

It was found in practice that much of the interference experienced originated in the heater circuit and necessitated the use of two low tension chokes connected in series, with the associated bypass condensers.

A likely point of interference is in the heater and cathode circuit of the converter valve, and we found that best results were obtained by running the output lead from the second choke directly to one heater pin of the converter, the other heater pin being grounded to a point right alongside the socket.

The heater of the I.F. amplifier was similarly grounded near the socket, the other side being connected to the converter valve, and the wire then passing on to the audio and output valves. Reversing the order of the supply, or having lengthy earth return leads for the heater circuit, was found to increase the interference level. As an added precaution we returned the cathode, screen, and A.V.C. bypasses for the converter valve to the same common point, thus avoiding having sections of the chassis in series with any of these circuits.

## EXPERIMENT NECESSARY

Variation is the rule rather than the exception in vibrator sets, and you may find it necessary to adopt other wiring mehods to achieve complete freedom from vibrator hash.

If hash trouble is encountered, short the aerial terminal to earth and turn up the gain to maximum. Then momentarily open circuit the positive heater lead, noting whether the interference is diminished thereby. If such is the case, then it is necessary to experiment with the placement of leads, chokes, and bypass condensers until no decrease in interference level is apparent, with the heater circuit momentarily disconnected from the accumulator.

## TUNING CIRCUITS

The layout of the set is such that the tuning circuits are well isolated from the power supply, but it is inevitable that some radiation will occur from the secondary leads of the transformer. With this in mind, the leads connecting to the vibrator socket should be cut short and kept well down against the chassis. The leads running from the vibrator back to the rectifier should preferably be shielded over their whole length.

Mount the two buffer condensers near the vibrator socket, and join the

(Continued on Page 83)


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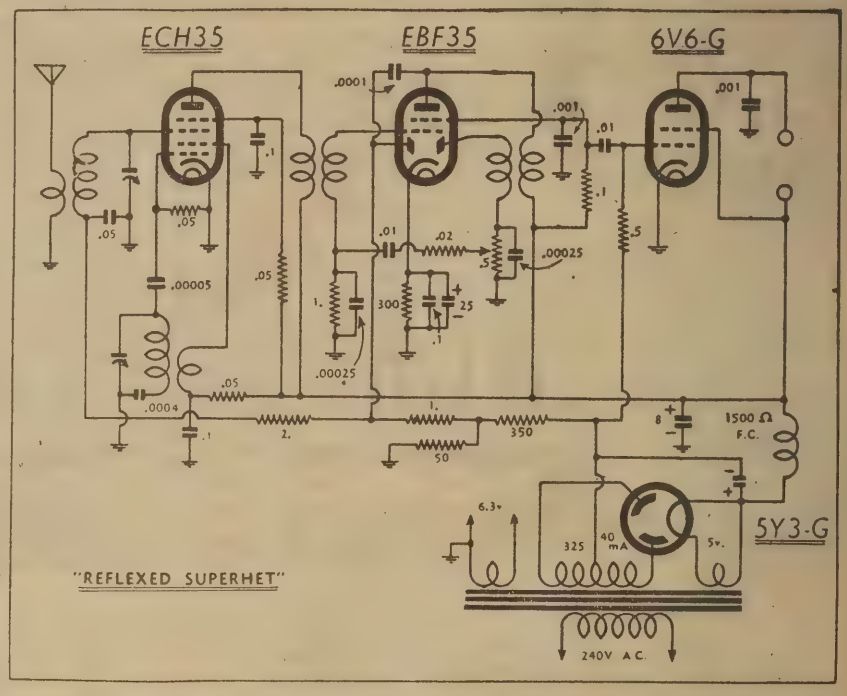
# A READER BUILT IT!

**Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.**

## NOVEL REFLEXED SUPERHET CIRCUIT

**This circuit, submitted by a reader from Belmore, NSW, uses a novel reflexed circuit arrangement which avoids the difficulties commonly associated with this type of set. Performance from its four valves is claimed to be equivalent to a five valve receiver.**




THE point of interest in the circuit is in the operation of the EBF35 valve.

Signals at intermediate frequency are impressed on the grid in the usual way, and amplified by the valve. They are passed on to the second I.F. transformer and thence to the detector diode.

Here the signals are rectified and appear as an audio voltage across the 0.5 megohm volume control. From the volume control the signals are passed back to the lower end of the first I.F. transformer, which is effectively grounded for high frequency voltages but not for audio signals.

### Reflex circuit

The audio is therefore impressed on the grid again and has a controlling effect on the plate and screen current. In most reflexed circuits, an audio load is included in the plate circuit as well as the second I.F. transformer.

The difficulty about this is that the limitation of plate voltage upsets the operation of the valve as an I.F. amplifier and allows some rectification to take place without reference to the diode detector. The rectified component is passed on directly to the output valve and cannot be reduced by the volume control. Apart from its nuisance value, the audio signal so derived often combines with the output of the diode to give a very distorted signal at low volume.

In the circuit submitted by Mr. Marsh, the I.F. amplifier plate is operated at the full high tension voltage and the audio is derived from the screen circuit which, in any case, must have a voltage dropping resistor The bypass condenser is made large enough to be effective at the intermediate frequency without upsetting too much the operation at audio frequency.

With this modification, the constructor claims that the output can be fully controlled from maximum to a mere whisper and remains distortionless throughout the whole range of adjustment. Using high gain valves and modern coil kit, he has tuned 43 stations on a 3-feet length of wire, which he claims to be a good performance in his district and location.

The rest of the circuit is quite straightforward, except that AVC is applied only to the converter valve, which is an ECH35. Almost any of the other frequency changer valves would operate in the same circuit arrangement although, for optimum results, a slight change in the oscillator anode and screen dropping resistors would be desirable to suit the exact requirements of the valves.

A 6G8-G or even a 6B8-G would operate satisfactorily in the I.F. amplifier socket, again without change to the circuit constants.

For the output valve a 6V6-G (T) would be the obvious choice for its small size. An EL3-NG would give slightly higher gain but will not fit into some of the smaller cabinets unless let down through the chassis. The back bias resistor would need to be reduced also from 350 to about 150 ohms.

The power supply is in a more or less standard arrangement as for the "Little General," but providing back bias for the converter and output valves. With a permagnetic speaker, the field coil would be replaced by a filter choke and a 225 volt per side power transformer used instead of the 325 volt unit specified.

Chassis and cabinet as for the "Little General" receiver would be quite suitable for this receiver. (From S. L. Marsh, 26 Lucerne-street, Belmore, NSW).

## PAY-AS-YOU-SEE TELEVISION

PAY-AS-YOU-SEE television was proposed last month by Commander E. F. McDonald, president of Zenith Radio Corporation, as a means of solving the economic problems of television broadcasting.

According to the plan proposed by McDonald, scrambled television signals would be sent through the air to the receiver in the usual fashion. Special unscrambling signals would be sent over the telephone wires, to which the set would be connected. To receive the programme in intelligible form, the user would call the telephone operator and ask for "Phone-Vision." Payment for the television service could then be made through the telephone company, much as for a long-distance call, if arrangements can be made with the phone companies.

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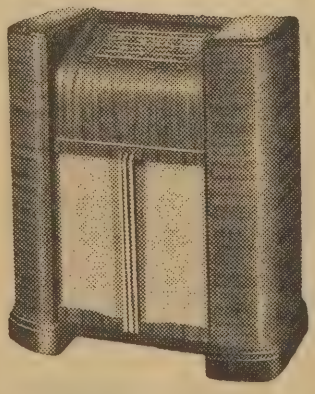

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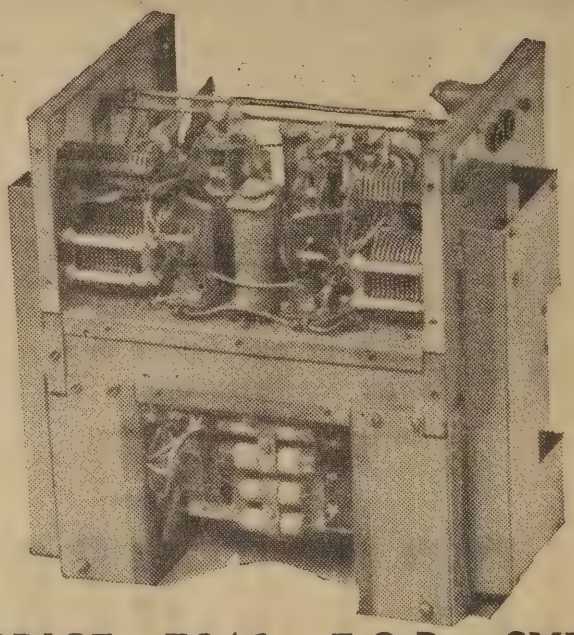

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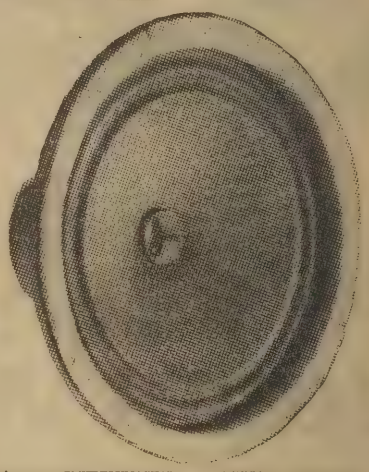

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# FROM THE SERVICEMAN WHO TELLS

**After many years at the servicing game, I rather pride myself that there are not too many jobs or circumstances which I cannot cope with. But to use the current colloquialism, a receiver I had to deal with during the month just rocked me to my foundations.**

NOT suspecting anything unusual, I answered a call to service the receiver which, it was stated, would play the local stations at only a whisper. On checking over the set, I found that the description was quite accurate. All the stations could be heard, but at only very weak volume.

As it was well away from the service shop, I wanted to rectify the trouble on the spot, and consequently pulled the chassis out for an inspection. It was an old TRF of about 1932 vintage, and in just average condition. However, checking over the voltages revealed nothing particularly out of order.

## AUDIO TROUBLE

Removing the grid cap of the detector and touching the grid produced no violent howl, so that the trouble was obviously in the audio end of the set. Touching the multimeter tip on the detector plate did not produce the usual click, which further confined the trouble to the output stage. However, the output valve appeared to be drawing normal plate and screen current, bias was quite okay, and there was no evidence of grid blocking, so that I naturally began to suspect the loudspeaker.

As there was the usual voltage drop across the primary winding, it appeared to be in order, and attention naturally turned to the secondary winding or the actual voice coil of the speaker. I unsoldered the connection at the speaker and checked with an ohmmeter, expecting to find one or other of the windings open circuited. Actually, they both proved to be continuous and had measurable resistance. Here was something unusual indeed.

Just at the critical moment, the man of the house walked in and saw me looking at the loudspeaker with apparently a rather puzzled air. He was most helpful!

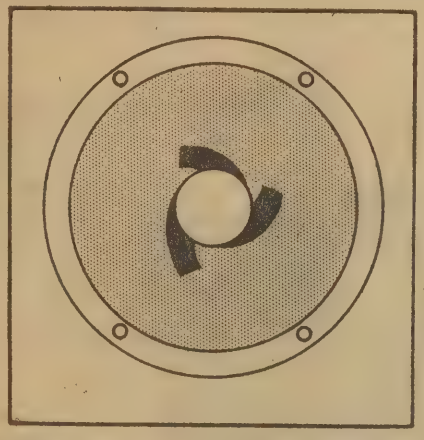
## RATTLING CURE!

It appears that the speaker cone had been rattling and our domestic genius took out the loudspeaker to see whether he could discover the source of the buzzing noises which so marred the reproduction. And, what do you think? He found that the rattling sounds came from the paper cone and that this was distinctly loose in the metal housing of the speaker.

So he promptly took out a tube of liquid glue and ever so carefully ran it down into the space between the voice coil winding and the inside pole of the loudspeaker magnet. To his complete satisfaction, the buzzing sounds ceased and the set played much better with this novel lubrication. The only trouble was that it would not operate next morning.

Perhaps one could hardly expect it to, because the voice coil was cemented firmly and irrevocably to the magnet pole. It's one for Ripley, I know, but I can take quite a solemn oath that it actually happened as I have said.

Unfortunately for our friend, his stroke of genius was costly. The



speaker was of a type for which no repair facilities are now available, but I may have been able to patch it up for him by careful treatment. As it was, the glue was there to stay, and I had to fit a completely new speaker to the set. Why doesn't somebody tell people these things?

Before speaker manufacturers adopted the scheme of dustproofing the air gap, a lot of trouble resulted from particles of dirt and metal lodging in the gap. Non-metallic particles can often be dislodged by the simple process of operating the speaker at high volume face downward. The vibration simply shakes the particles loose and they fall out without much trouble.

## STEEL PARTICLES

Steel particles are a different story, since they are retained by the magnetism of the field coil or the magnetism they acquire themselves. Hence they are seldom dislodged by the above operation.

My own trick is to magnetise a small steel screwdriver by holding it up against the magnetised pole of the speaker to be repaired. The voice coil is then inspected carefully to see whether any tiny whiskers of metal are apparent. If they are, one can pick them off with the magnetised screwdriver.

Then, gently but firmly, pull the cone forward to expose as much of the voice coil as possible. Do not use too much pressure, however, or you may tear the cone or strain the centring spider. More metal chips may be revealed, and these can likewise be picked off with the magnetised screwdriver. Work the cone backwards and forwards and pick off any metal filings which may come to light.

By continuing the process and occasionally blowing into the gap one can often clear away all the offending particles. The cone should then move freely back and forth without scraping noises and reproduce the signals without rattles.

## CONES CENTRING

If trouble is still evident, the centring of the cone can be checked. One recognised method is to obtain a scrap of stiff but not too thick drawing paper and cut three strips measuring about two inches long by about ¼in. wide. Alternatively, the strips can be cut from thin celluloid or fibre.

Loosen the locking screw or screws holding the centring spider, and work the three strips down the space between the voice coil and the centre pole piece. The first two will go in easily, but you may have to pull the cone over slightly to get the third one in. If it won't go, try some thinner packing.

Work the spacers in by an equal amount and at an angle, then tighten the screw or nuts holding the centring spider. Withdraw the packing pieces and the cone should be held centrally in place.

A persistent rattle after this adjustment may indicate that there is a looseness in the assembly, and close inspection may reveal the cause of the trouble. Occasionally a spot of quick-drying cement will put matters right.

Remember to check the voice coil leads, as these can cause trouble simply by rattling against the rear of the cone.

## BATTERY TO A-C

Last month I had quite a lot to say about a weekend in the country. There was one reference I had to omit because of pressure on space. So let's get back to my weekend or "busman's holiday."

Sunday morning found me relaxing comfortably in a deck chair enjoying the spring sunshine and the twittering of birds. Yes, I was reared in the country and like it. Into this idyllic setting came a chap who wanted advice about converting his set for ac operation. The mains had just been connected to his house, his batteries were beginning to run down and he was thinking along very obvious lines. The editor assures me that quite a lot of readers are faced with the same problem.

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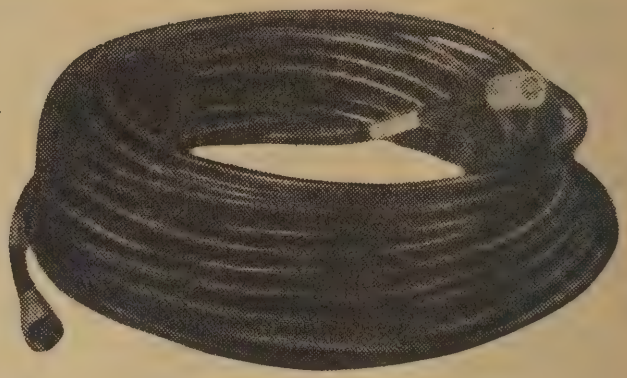

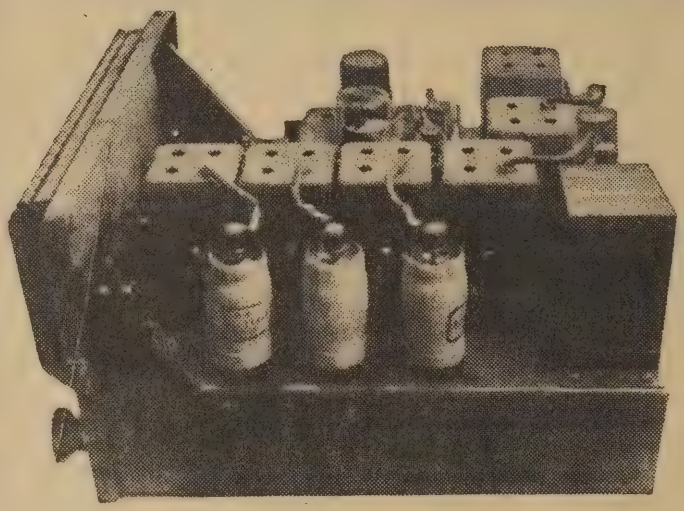

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Valves used are: 1-VR136 R.F. stage; 1-VR137 oscillator; 1-EA50 mixer; 5-VR65 I.F. stages; 1-EA50 detector; 1-VR65 audio stage.

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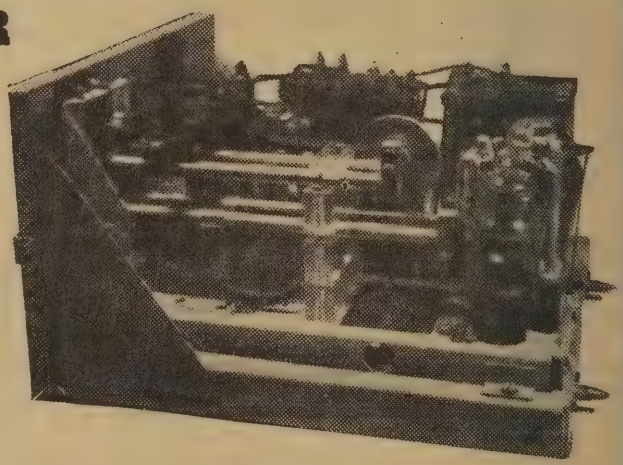

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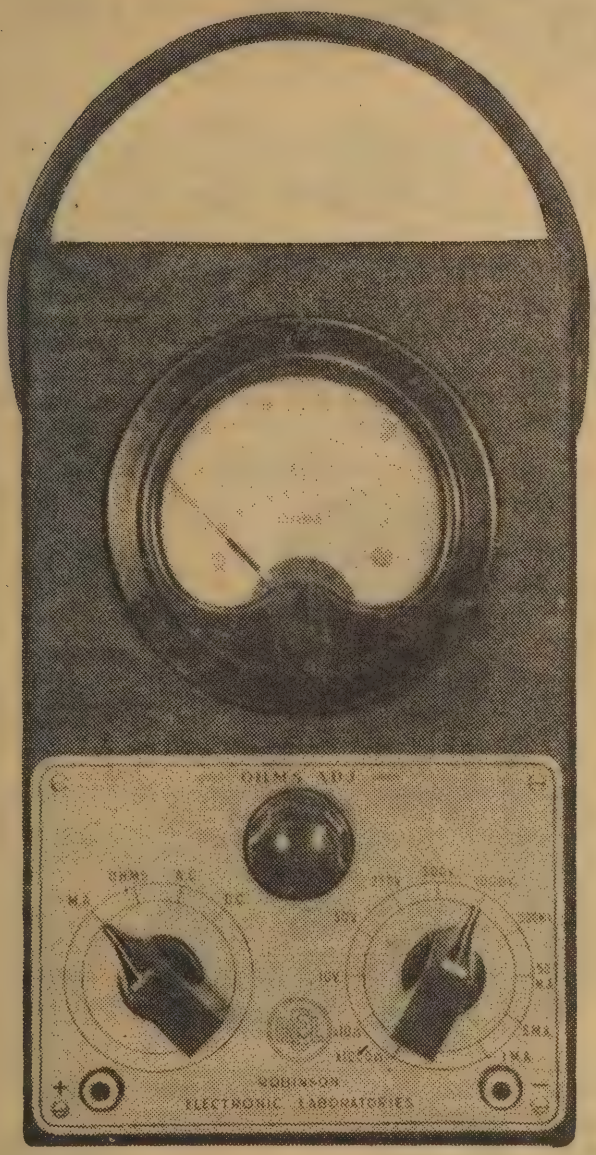


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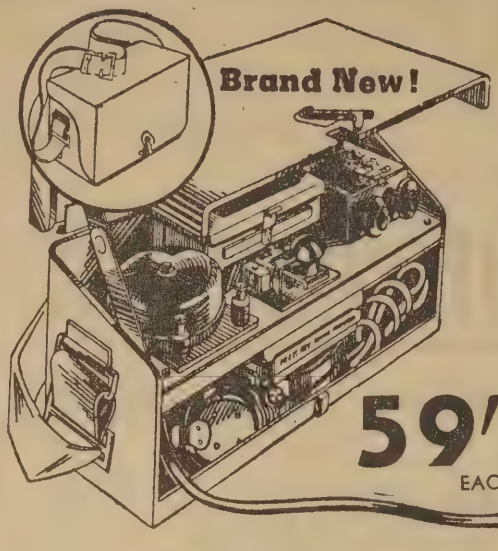


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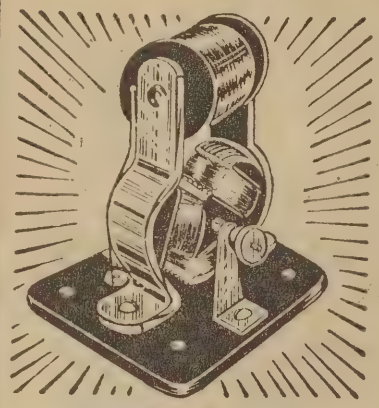

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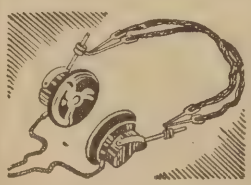

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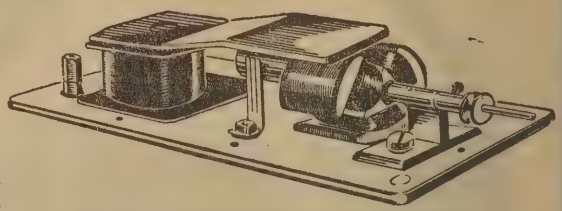

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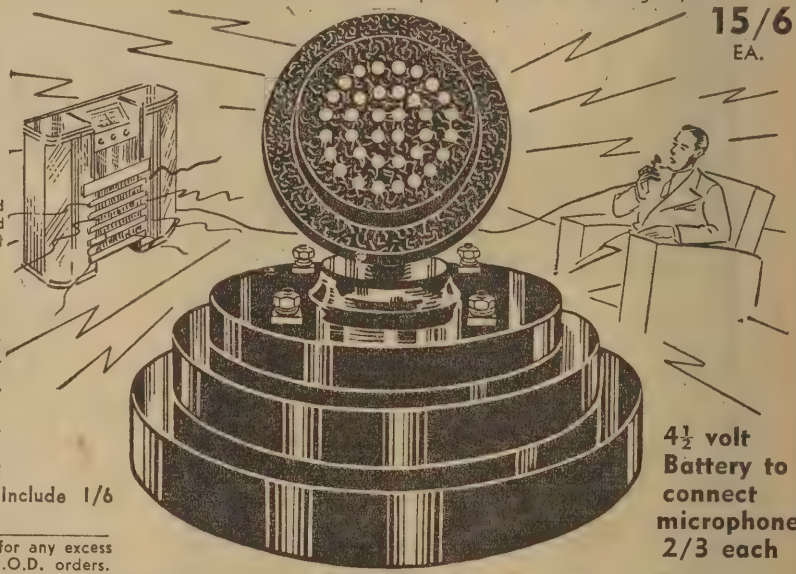
Connect to pick-up on your radio, practice announcing in your own home. Can be used on any radio, English manufacture. Simple to connect, Full instructions included. Hook-up wire 1/3-30 ft. Postage 1/6.

**15/6** EA.



**4½ volt Battery to connect microphone 2/3 each**

**PHONE NEWCASTLE B3465 ——— ADDRESS TELEGRAMS "STANRADIO," NEWCASTLE**

# NEW STANDARD RADIO

## 102 HUNTER ST. NEWCASTLE.

This chap knew little about radio but reasoned that he should be able to make up some gadget which would take the place of the batteries. Checking through the requirements with him, I reasoned that it would cost him over two pounds to build a supply to replace the B batteries.

## A COMPROMISE

The filaments would be a more difficult proposition, involving a low voltage, high current supply. This would have to be very carefully designed to deliver just the right voltage at the particular current drain and be well filtered to prevent hum troubles. Some form of metal rectifier would be essential, with special low resistance filter chokes and high capacitance electrolytic filter condensers. The cost of this would be substantially higher than the B supply.

And the ultimate result would be very much of a compromise as receivers go. For the outlay for the A battery substitute he could buy probably four new ac valves and could cover the cost of a fifth one by selling the half-used battery valves at a reduced price. In the light of this, I suggested that our friend consider altering his set—or having it altered—to take mains-type valves. By proper choice of circuit arrangement it might be possible to confine the modifications mainly to the screen and cathode circuits. The power supply would normally be built on another chassis, but would otherwise be of conventional pattern.

Still another alternative I suggested was to try and sell the receiver or trade it in on a mains operated set of equivalent design. Which of these courses our friend may decide to follow I have no idea but I had to explain the false economy of spending a lot of money on building new A and B battery eliminators.

## ELIMINATORS

A few years ago one could easily pick up an old commercial B battery eliminator for about a pound, which could be used with the existing accumulator and thus avoid at least the expense of B batteries. However, these old eliminators are no longer plentiful and the position alters when one has to spend two or three times the amount on parts for a new one.

The best course of action in such a case depends on many factors—the nature of the battery set, whether it can be traded in or disposed of favorably, the affluence of the owner, and whether the owner has sufficient technical knowledge to make alterations himself.

## ABOUT VIBRATORS

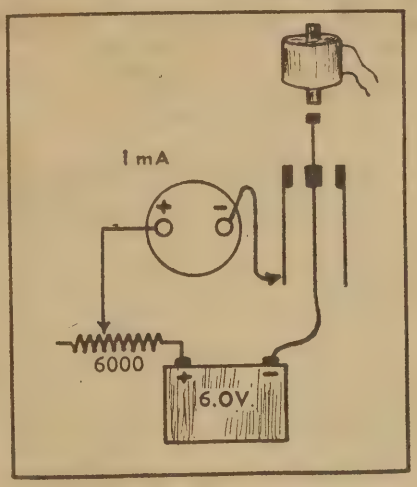
There was one other item of technical interest about the trip. This concerned a vibrator powered set which had stopped because of a faulty vibrator unit. Apparently it had been in service for a couple of years at least, so that one could hardly blame it for failing.

I naturally did not have a replacement cartridge with me, but thought I might be able to patch up the existing one to carry on until a replacement could be forwarded from the city. So I removed the cover and had a look at the contacts.

As I had expected, the contacts were badly pitted and the reed was actually welded across to one of them. Hence the failure to operate.

Working carefully, I prised apart the welded contacts, allowing the reed to revert to its central position. Then, using a magneto filing strip from the car tool kit, I tried to clean up the contacts as much as possible. The contact material is very hard, but the worst irregularities yielded to treatment.

The operation left the contacts displaced from what I knew to be the correct positions, so that it was necessary to bend them slightly to permit them to close evenly as the reed moved from side to side. A very ticklish operation, particularly for one who does not normally have much to do with vibrators.




This circuit is used for testing vibrators as described in the text.

The primary contacts should ideally close a "whisker" before the secondary contacts, thus minimising the current made and broken in the primary circuit. One can set the operation roughly by eye, but a more accurate indication with some types can be obtained by using an ohmmeter. The types I refer to employ a separate driving contact and access can therefore be had for measurement directly to the main contacts without confusion with the driving voltage.

## CARTRIDGE TESTS

A recognised method of testing such cartridges is to arrange a series circuit including a 6-volt battery, 6000 ohm series resistor and 1-milliamp meter, the combination being wired in turn to each contact under test. When the contact is directly shorted across a current of 1-milliamp naturally flows through the circuit and the meter reads full scale—1-milliamp. For exact adjustment, the 6000 ohm series resistor is made variable.

To check the operation of the vibrator, the reed is set into operation by the application of the correct driving voltage. The meter naturally reads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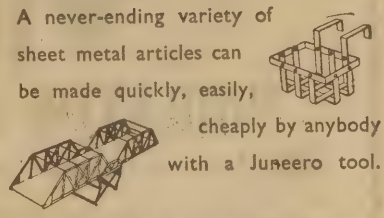

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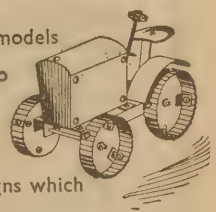

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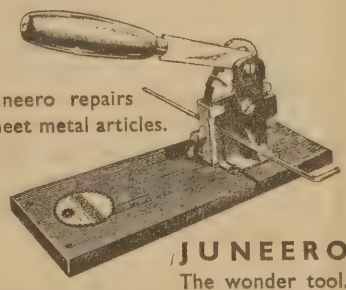

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# FERGUSON'S RADIO PTY. LTD.

## RELEASING

# "VIBRAPOWER"

## VIBRATOR POWER SUPPLY TYPE V.S. 140.

**GENERAL.** The Ferguson "Vibrapower" unit is a compact, self contained vibrator operated power supply designed to operate from a standard 6 volt accumulator.

The unit has been designed to simplify the conversion of battery operated radio receivers over to vibrator operation. However, it may be used as a replacement for "B" batteries in portable equipment, or as a complete power supply for standard vibrator receivers.

**DESCRIPTION.** A fabricated steel case measuring 9½" x 6" x 4" finished in grey wrinkle duco, and fitted with rubber mounting feet, houses the unit. A carrying handle is also fitted to the case for ease in transportation.

Weight .. .. .. .. ..10 lbs..

**ELECTRICAL SPECIFICATION.** Two output circuits are provided, one is a filtered low tension 6V filament supply, which can be used with current drains up to 300 mA. The other is the normal high tension supply, which will deliver an output current of 20 mA (max). The output voltage under these conditions is 140 volts D.C.

Both L.T. and H.T. outputs are adequately filtered for A.F. and R.F. noise

| INPUT | OUTPUT |
|---|---|
| 6v. at 0.95 Amp. | 140v. at 0.02 Amp. |

**CONNECTIONS FOR USE.** The input and output connections are made by means of a standard six pin plug, which is inserted in the socket provided at the end of the unit. Wiring to the plug is shown in the accompanying diagram. It is important that the recommended wiring to the receiver be observed, otherwise trouble may be experienced due to false earths, and "hash" may become apparent over portions of the short wave band. No trouble is experienced if the wiring diagram is adhered to.

**OPERATION.** Since the output voltage polarity is determined by the polarity of the input, it is important that the supply leads from the radio set are connected to the correct terminals on the accumulator. Incorrect connection will result in non operation of the radio, and damage may be caused to the condensers and vibrator cartridge in the "Vibrapower" unit.

One of the outstanding features is that either a Ferrocart Type P.M. 413 or an Oak Type V5124 vibrator cartridge can be used without any change in the operation of "Vibrapower."

When installing or replacing a vibrator cartridge, the six screws holding the base of the case should be removed, the lid slid off, and the cartridge inserted.

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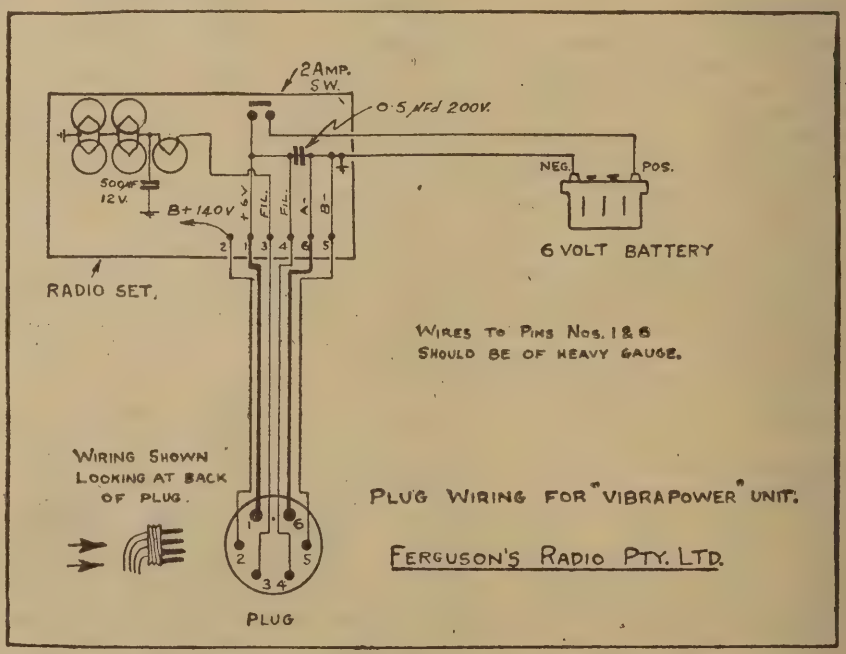



**FACTORY REPS.: N.S.W., VIC. & QLD., ELECTRONIC INDUSTRIES IMPORTS PTY. LTD. S.A., APEX AGENCIES.**

less than full scale, depending on the proportion of total time that the contacts are open or closed. Under the particular test conditions, it is usual to set each primary contact to read 40 per cent. of full scale and each secondary contact to 38 per cent. full scale.

This simply amounts to reading apparent resistance or continuity and the test can be performed with the ordinary resistance scale of a multimeter. However, allowing for the fact that these instruments usually operate with an internal 1.5 or a 4.5 volt battery, the test readings will not normally be as high as 40 per cent. and 38 per cent. for the two sets of contacts.

Hum in this set was reduced by adding extra filter condensers and minimising mechanical hum in the transformer laminations.

In practice, one can usefully run a test on a couple of new vibrators to note just what readings are obtained with one's own multimeter scale. A vibrator under repair can then be modified as necessary to conform to the figures obtained from a new unit. The important point, of course, is to set the secondary contacts for a slightly lower reading than the primary contacts—about 2 per cent. to be precise.

An alternative approach is to bend the contacts in until something approaching the correct output voltage is obtained in the actual receiver. Assuming that there are no unnatural conditions in the high tension circuit, this is some indication that the contacts are remaining closed for the correct proportion of the time cycle. The vibrator is then held up to the light and the individual contacts re-adjusted slightly by bending until they appear to close evenly, the secondary contacts lagging just a trifle.

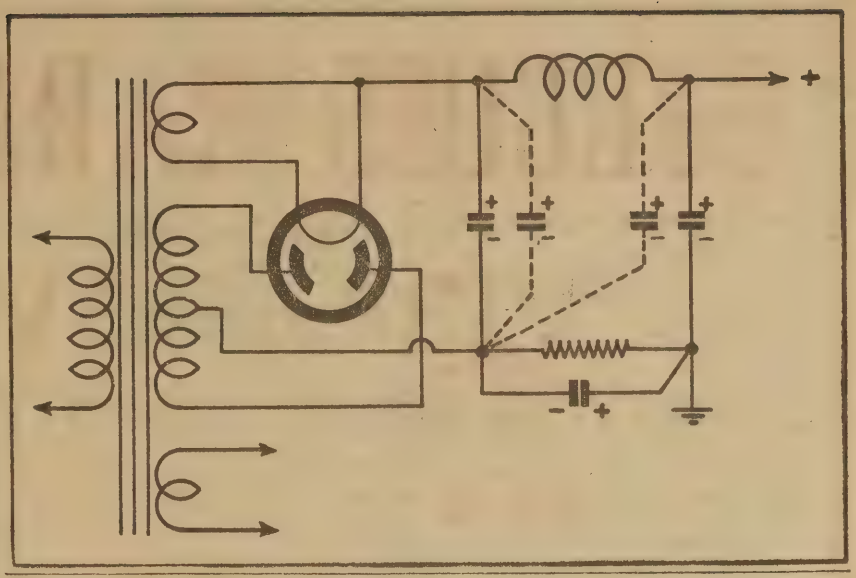
These remarks are made more than anything as a guide to procedure under emergency conditions. In the normal way, a cartridge which has failed has usually just about reached the end of its life anyway and must be regarded thenceforth with definite suspicion. At the first opportunity it should be replaced with a new unit.

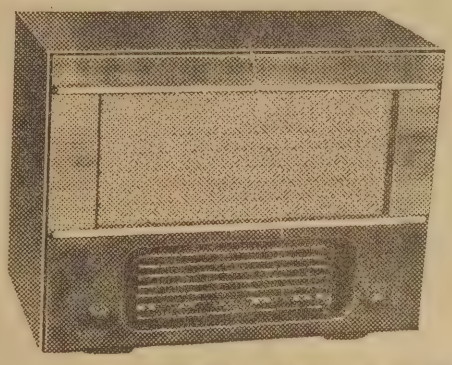
## HUM TROUBLES

I had a case the other day of a set humming sufficiently to annoy the owner, who happened to be rather fussy about this point. I couldn't help contrasting his attitude with the outlook of other set owners I have met, who have grown accustomed to a really terrific amount of hum. The type of hum, I mean, which results from two practically inoperative electrolytic condensers.

This particular set had a certain amount of residual filter hum, which I eliminated by the addition of a couple of extra condensers in parallel with the existing units. In fact, with the chassis out of the cabinet, I could barely hear any evidence that the receiver was switched on.

(Continued on Page 92)



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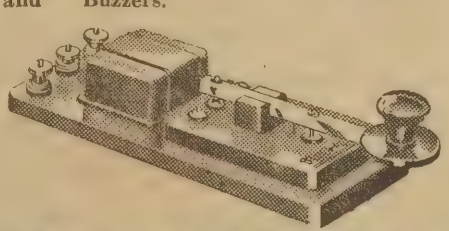

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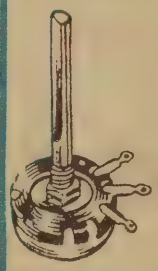

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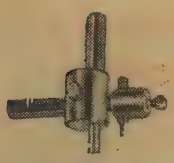

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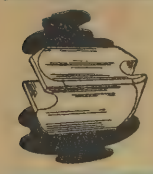

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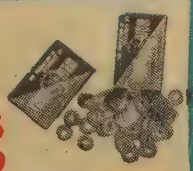

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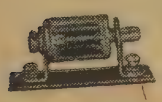

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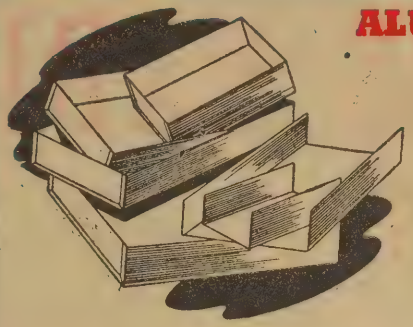

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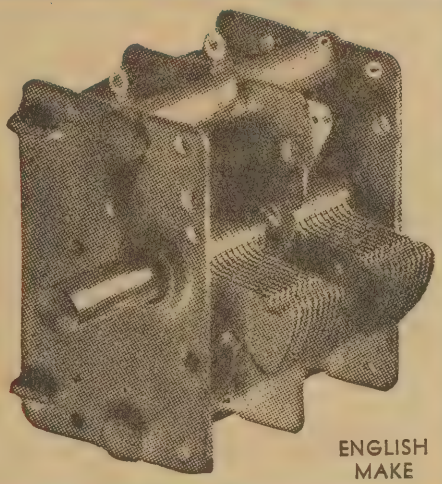

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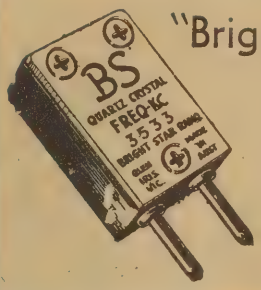


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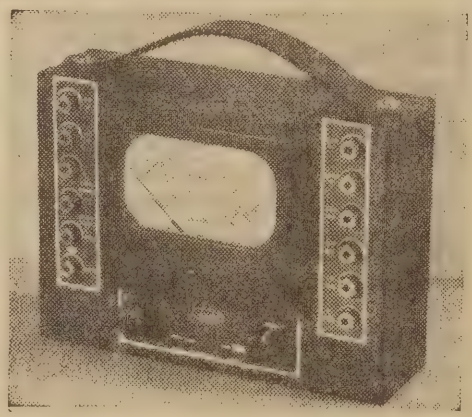

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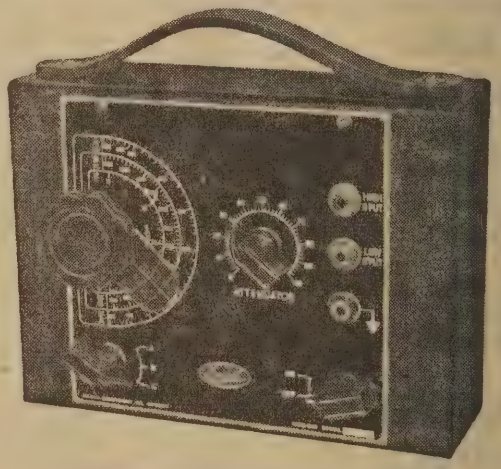

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PART TWO

# Home Recording

**Last month's article on home recording dealt with playback discs, playing time and recording speed. It was pointed out that the average gramophone motor is unsuitable for recording purposes, except where special adaptations can be made. As a rule, the turntable and motor assembly must be specially designed for the job.**

RECORDING turntables are usually of solid metal, carefully balanced and mounted on a bearing free from looseness or rumble.

The power is almost invariably provided by a carefully balanced motor, running at synchronous speed and with no provision for mechanical governors. And the drive usually involves a rubber medium between motor and turntable.

The turntable may be fitted with a rubber edge-band, against which the motor spindle revolves. Or the motor spindle may have a rubber collar bearing against the edge of the turntable.

## POWER COUPLING

Yet again, power may be transmitted by a flexible leather or rubber belt. The exact scheme does not matter, provided that there is no trace of vibration on the turntable, that the drive is positive and that the whole system is not likely to alter its characteristics quickly due to wear.

The absence of a governor makes it necessary to adjust the pulleys or bearing surfaces to the exact ratio necessary to give the required speed. One cannot hope to enlarge on this statement more than to emphasise that some mechanical knowledge and facilities must be available before a successful turntable can be provided. And, of course, there is the matter of a few pounds outlay for a fractional horsepower induction type motor.

It is naturally handy to be able to vary the turntable speed at will from 33 to 78 rpm, but there are mechanical problems in arranging a convenient two-speed friction drive. Don't forget, by the way, that a turntable must always operate in a clockwise direction. This remark is not so trivial as may appear; more than one constructor has overlooked the point in working out the drive arrangement for a particular motor.

From the home recordist's point of view, 33 rpm recording is of secondary interest. Its advantages are obvious only with 16in. discs, and few people have the facilities to play anything more pretentious than 78 rpm 12in. discs.

## HEAD CARRIAGE

Furthermore, the problems of speed control and frequency compensation in the amplifier are much more difficult at the slower speed. You will be doing quite well to acquire or manufacture a good turntable arrangement for 78 rpm only.

Next requirement is a mechanism to carry the recording head smoothly across the disc at a pitch of about 100 lines per inch, and herein is another very real problem.

Some commercial equipment uses an arm of more or less conventional appearance which is driven from beneath the base by a quadrant or a system of worm gears. The base drive has the obvious advantage of compactness and tidiness in appearance and allows free rise and fall of the cutting head with irregularities of the disc.

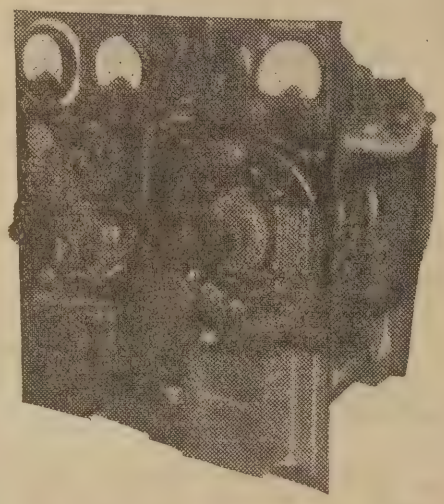
But the slightest imperfection in the drive mechanism, or the slightest play in the bearings, is magnified by the length of the arm. And when one is trying to cut grooves at a pitch of 100 to the inch, there is absolutely no room for error. Unless you are mechanically very adept, and have at your disposal some accurate machine tools, don't attempt to manufacture a base drive for yourself.

## OVERHEAD SCREW

The alternative is an overhead lead-screw arrangement, driven generally from an extension or attachment to the turntable spindle. The threaded rod is made to turn, by angle gears, at such a speed that the cutting head moves across one inch of the record surface for every 100 revolutions—or thereabouts. The movement is transmitted from the thread to the cutting head by a half-nut or more simply by a single finger fitting into the thread.

One of the troublesome tendencies is for the half-nut or finger to climb partly up the side of the engaging thread, then to slide suddenly to the bottom of the thread. Thus, instead

# USED DISPOSALS EQUIPMENT



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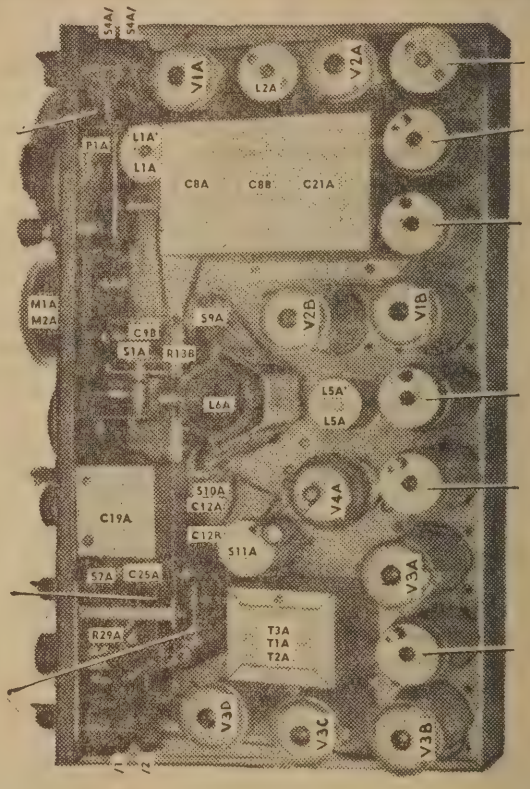


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of the head moving smoothly across the disc, it progresses by a series of tiny jumps. Hence the use of a square thread in some commercial mechanisms, with a close-fitting single finger to engage it.

It is generally wise to swing the head from a carrier bar, rather than to pivot it directly on the lead screw. The latter scheme can be made to work, but there is danger of the rotational thrust from the thread being transmitted to the head in terms of needle pressure. And, if the thread is imperfect, the result will be obvious.

## MUST BE GOOD

Once again, one cannot expect to outline all the precautions and calculations necessary to make a successful traversing gear. But it has to be good, and, if you have not the facilities to make it yourself, the best plan is once again to purchase a ready-made article.

One may mention in passing, that lead-screw devices are to be found in some of the old Edison-type phonographs. These can be pressed into service, but only with a generous helping of mechanical skill. These things are not said with the idea of unduly discouraging home constructors, but it is absolutely essential to stress the need for very careful planning and precision work.

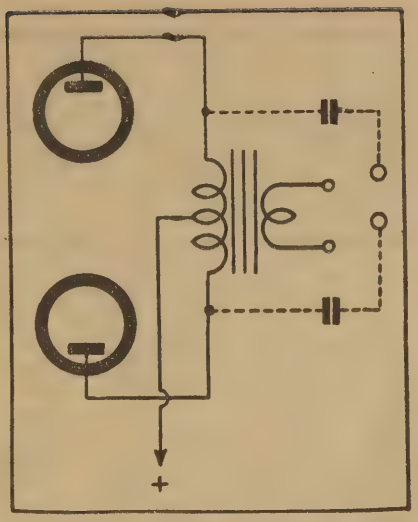
Once completed, the traversing mechanism should be mounted on a rigid framework carrying also the motor and turntable. For preference, the equipment should be set up in permanent fashion, without trying for portability. There must be no vibration on the turntable or the traversing gear, and this may involve mounting the motor separately or on resilient rubber bushes.

Half the secret of making consistent discs is to have the mechanical set-up constant in its characteristics. If there are variable factors and one has to tinker with the gear before each session of recording, then it is inevitable that the percentage of spoiled discs will be high. So, unless portability is an essential feature, set the equipment up permanently in a central and convenient position and take the sound to it by electrical lines.

## CUTTING HEAD

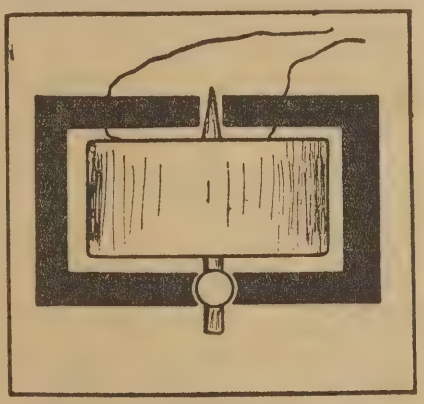
The next point for discussion is the all-important one of the cutting head. Manufacturers of recording equipment are quite happy to supply excellent cutting heads for upwards of £50, but no home recording enthusiast is likely to be in a position to pay such an amount purely as a contribution to his hobby. The usual resource is therefore to adapt an ordinary magnetic pickup for the purpose. One cannot look for the same excellent and consistent characteristics that are available from the proper article, but passable results can nevertheless be achieved.

The basic requirement is for a pick-up head having an initially good frequency response. Many prewar pick-ups will be found suitable, but not the real old-timers with large moving mass and metallic resonance effects.



According to impedance requirements, a cutting head may be fed from the plate circuit of an amplifier or through a transformer. The blocking condensers need to be of high quality and large enough to prevent undue effect on the bass response.

A second requirement is mechanical and electrical strength, made necessary by the fact that the head will be called upon to absorb and utilise a



For low distortion and level bass response, avoid having the clearance between reed and pole pieces too fine.

watt or more of audio power, with possible severe overload on occasions. There is not much else to say on this point except perhaps to observe that the average enthusiast will probably be able to form a good opinion of the quality and strength of a pickup from a close examination of its construction.

In the majority of magnetic pick-ups, the iron reed operates within a gap which is deliberately kept small to provide the maximum possible output voltage and some degree of inherent bass boost. Such close spacing usually introduces an abnormal degree of harmonic distortion, while the increased sensitivity at the bass end is not desirable for recording purposes.

Because of this, improved results can often be obtained from an adapted pickup by opening the gaps in the magnetic circuit and striking a different compromise between sensitivity and fidelity. No hard and fast rules can be laid down, but the point is mentioned so that experiments can be carried out. Rather than file away the pole pieces, it is better to spring the assembly apart, if possible, allowing the poles to be closed up again if the adjustment is taken too far.

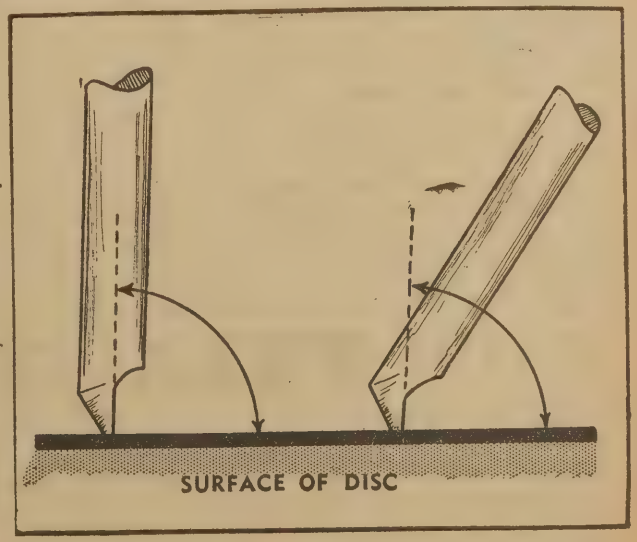
## IMPEDANCE

The impedance of a cutting head is a very complex characteristic, being highly reactive and varying widely with frequency. In the absence of definite data, the home constructor can only accept an approximation for the order of the load presented and arrange to feed it in the most convenient manner from the audio amplifier.

The ordinary high impedance magnetic pickup has an impedance of a few thousands ohms and is best fed directly from the plate circuit through a blocking condenser or through a transformer of about unity ratio. Since the load is of rather unpredictable value and highly reactive, it is essential for the amplifier to have a low inherent output resistance and a reserve of power output.

As an alternative to using a conventional high impedance pickup, you may be fortunate enough to obtain a head with a nominal 500 ohm impedance and this can be fed very conveniently from an output transformer matching the load requirements of the amplifier to a 500 ohm line.

The cutting face of the stylus must make an angle of between 85 and 90 degrees with the surface of the disc.



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A still further possibility is to remove the high impedance winding altogether and to fill the bobbin instead with fairly heavy gauge wire, feeding the winding from the normal secondary of the output transformer, as used for a loudspeaker voice coil. This plan is very convenient where the pickup head has an open circuited winding which requires replacement. There is no easy way of determining the correct gauge of wire to use, reliance having to be placed on practical results and the fact that the amplifier has—or should have—plenty of power output and a wide tolerance to load variations.

As a rule, the same needle chuck assembly can be used, since recording and playback needles generally have a similar diameter of shank. The recording stylus usually has a flat surface which, when gripped by the locking screw, ensures that the cutting face is presented at the correct angle to the travel of the disc.

### STYLUS FUNCTION

The recording stylus functions exactly as a miniature lathe tool and, in fact, it is shaped in similar fashion to cut a "V"-shaped groove with a radiused bottom. Because of this, the angle which the cutting face makes with the surface of the record is quite important. Various combinations of weight and cutting angle may produce a groove of the right depth, but there is more to it than just that.

When the cutting angle is correct and other conditions right, the ribbon of material removed by the cutter comes away evenly as a continuous thread. Failure to do so—assuming a good disc—may indicate an incorrect vertical angle, a blunt cutter, or a needle slightly twisted in the chuck, and therefore not throwing the thread positively to the centre of the disc.

The angle which the cutting face makes with the record surface is usually between vertical and a trailing angle of about 5 degrees. For home-made equipment it is wise to allow for slight adjustment of this angle, the cutting head being locked permanently in position once the optimum has been found by experiment.

The majority of cutting stylii have the cutting face ground exactly parallel with the shank, so that the needle chuck must be almost vertical with respect to the record surface.

### 30 DEGREE ANGLE

This presents something of a problem when mounting up an adapted pickup, since the mounting arrangement of the chuck or the head itself is generally planned to give a needle trailing angle of anything up to 30 degrees from vertical. This, in turn, means either that the arm attachment has to be modified or that the whole body of the makeshift cutting head has to be mounted at an odd angle with respect to the vertical.

As a point of interest, steel recording stylii are now available with the cutting face at an angle to the needle shank, and these allow a converted pickup head to mount at more or less its accustomed angle with respect to the surface of the disc. In other words, the needle shank has a pronounced trailing angle, but the offset in the grinding of the tip puts the cutting face in a near-vertical relationship with the surface of the disc.

The cutting head must naturally be pivoted, both to allow it to be lifted out of the way and also to follow slight irregularities in the disc during recording. The pivots should be free but absolutely firm, and reliance should be placed on weight and counterweight for the needle pressure, rather than on doubtful spring arrangements.

### PIVOT POSITION

It is important to pivot the head as far behind the cutting point as possible, in order to prevent too obvious a change in stylus angle as the cutting head rises and falls. The base-driven type recorders have a clear advantage in this respect. Plenty of attention should be given to this point, as incorrect pivoting methods will render the mechanism unduly sensitive to irregular discs or variations in thickness.

Two types of recording stylii are in common use, namely, the steel and sapphire. The latter are very hard, and will record a great number of discs without resharpening However, they are very brittle, and may chip if mishandled. Most frequent cause of failure occurs when the groove is accidentally cut right through into the base metal.

Steel cutters are less prone to such damage but become blunt more quickly. They may record anything from six to 30 sides, depending on a variety of factors and the degree of excellence which must be maintained. The beginner's best plan is to start off with a steel cutter, changing to sapphire when the equipment is operating in more or less its final and satisfactory form.

The amount of audio power required to drive a cutting head varies widely, according to the sensitivity of the mechanism and the required level of recording. Broadly speaking, the audio power required is seldom less than a couple of watts, and it may go as high as six or seven watts.

Allowing for the fact that the load presented by the head is highly reactive and that low distortion is essential, it is just as well to provide a minimum of 10 watts clean audio in even a simple recording amplifier. Push-pull triodes are much favored, or pentodes with plenty of voltage feedback. For simplicity, a single large output valve can be used, but with plenty of feedback to reduce the plate impedance.

### RECORDING AMPLIFIERS

The subject of recording amplifiers has been discussed already in an earlier issue, and it is only necessary here to mention the important points. Apart from the necessary power, the amplifier must have low distortion under operating conditions and a low hum content.

It should be equipped with an output level indicator and have provision for a monitor speaker or headphones. One or both of these devices is essential if

all discs are to be cut at substantially the same level from different signal sources.

At least one high-gain microphone channel is normally required, plus another high-level channel for connection to a pickup or radio tuner. A simple mixing circuit is valuable in obtaining smooth production involving the "dubbing" of background music behind dialogue. Watch the royalty position, by the way, before you carry on any such activities on a commercial basis.

Another point is that the amplifier must have some provision for frequency compensation, both in the bass and treble register.

## BASS END

At the bass end, it is customary to maintain a constant amplitude characteristic below about 250 c/s, which simply means that the bass response must deliberately drop away by 6 decibels per octave below this "turnover" frequency.

The practice is adopted in all commercial recordings, although there is some variance at the moment as to where the turnover point should occur. Some go as high as 900 cycles, while others compromise between the extremes with a constant amplitude characteristic below about 500 c/s.

However, some measures are essential to limit the bass response since, for a constant energy level, the amount of groove deviation would otherwise go on increasing with decreasing frequency until it became prohibitively great. The result would be either breaking through of the tracks or the necessity to limit severely the whole amplitude of the recorded sound.

As mentioned earlier, this limitation of the bass amplitude can be resolved simply as a recording loss of 6 decibels per octave below the turnover point. If this occurs at 250 c/s, then the response will be down 6 db. at 125 c/s, 12 db. at 62 c/s, and 18 db. at 30 c/s.

When playing back lateral discs, there is therefore a necessity to restore this loss, either by the mechanical design of the pickup itself or by electrical compensation in the amplifier. Ordinary crystal pickups have just about the right amount of compensation when operating into the specified load — usually 0.5 megohm. Cheap magnetics have partial inherent compensation with usually a liberal admixture of harmonic distortion.

## NEWER PICKUPS

Modern high quality pickups, boasting low weight and needle inertia seldom have any inherent compensation at all, necessitating the use of an amplifier with just the right amount of bass boost to offset the recording loss.

The same problems naturally exist for home recordings, and provision must be made to limit the bass response in the recording process. Played back under similar conditions to those holding for commercial discs, the balance at the bass end should be similar.

The desired characteristic is often achieved in the cutting head design by suitably limiting the inductance of the windings, or by special damping arrangements. Or, again, the effect may be achieved by using a commercial cutting head with a particular output transformer or coupling network specified by the manufacturers. Where this is done, the characteristic of the amplifier itself can be substantially flat.

One can scarcely hope for such carefully controlled characteristics in a home-made cutting head, so that provision for some bass attenuation must be made in the amplifier itself. The desired result can usually be accomplished by utilising a deliberately small coupling condenser between two stages, which will cause attenuation below a certain frequency.

If the characteristics of the cutting head itself or any other part of the system introduce additional loss in the bass register, somewhat less than the full amount of bass cut may be desirable in the interstage coupling network. In the absence of test equipment, the amateur usually has to rely on listening tests, which lump together all effects between the microphone and loudspeaker.

There is therefore good argument for making the bass response variable, so that it can be set for the best judged result. By the same means, due allowance can be made for the nature of the recorded sound — voices which are unnaturally endowed with or deficient of lower tones.

In the amplifier recently described, we carried the matter to its logical conclusion and arranged the switching to provide several degrees of bass cut and positions for level response and bass boost. The amplifier can thus be used for playback purposes, where bass attenuation is not required.

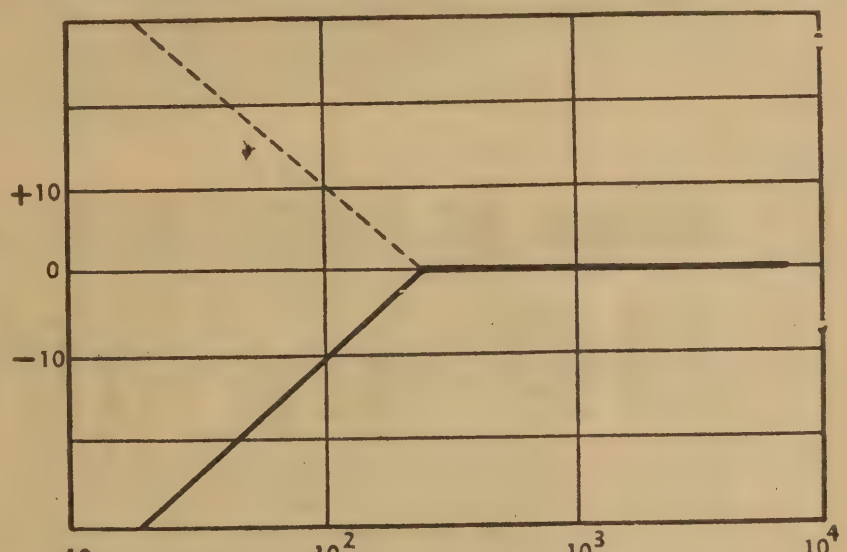
In the treble register, the need seldom arises for attenuation, since losses tend to increase with rising frequency. In commercial circles, some discs are new recorded with a rising high note response. When played back, corresponding attenuation is used, background noise being reduced as a result.

But even apart from this, there is a tendency for the treble response to be poor towards the inside of a disc, due to the limited diameter and the low lineal speed of the groove past the stylus and needle. The physical wave length becomes shorter, the wave front becomes steeper, so that cutter and needle have difficulty in recording and playing back the upper frequencies adequately.

## INSIDE TRACK

This limitation is overcome to some extent by applying treble boost to a degree which can be reduced as the needle approaches the outside of the disc. Large amounts of boost are necessary when recording at the inside of small discs at 78 rpm. or at correspondingly greater diameters at 33 rpm.

For these reasons, a recording amplifier should be provided with a circuit giving smooth and continuous control over the treble response, from level to something like 20 db. boost at 7000 cycles per second. This usually means the use of one extra valve, the degree of complication depending on the requirements of the apparatus. A simple treble boost circuit was included in the R & H "Recording Amplifier" described a couple of months back.




To avoid overmodulation of the grooves, a bass cut characteristic must be achieved in the recording, necessitating corresponding boost in the amplifier equipment.

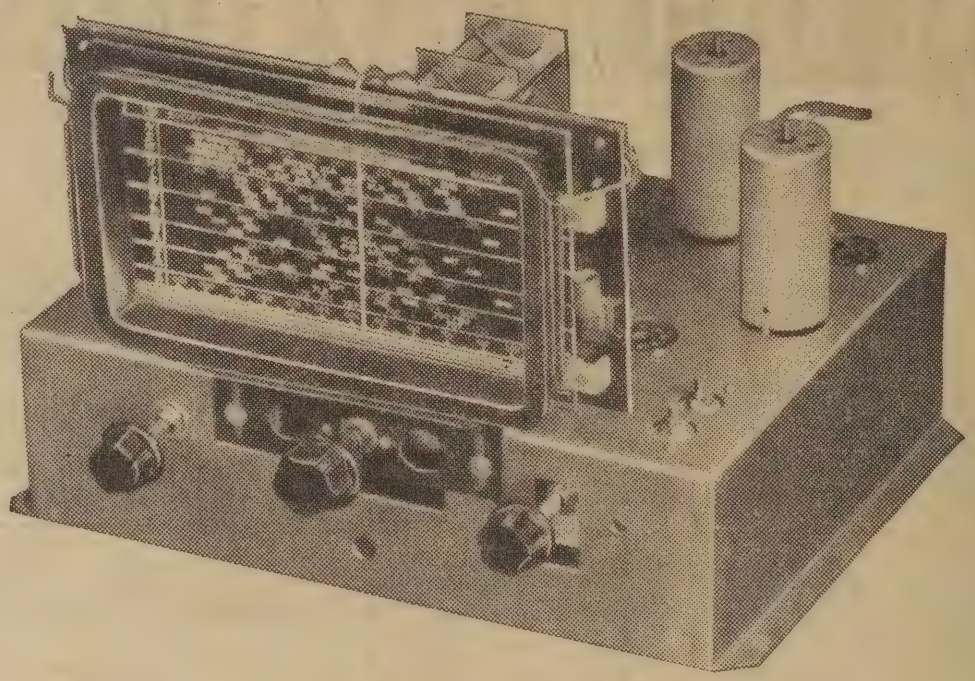
Items for home recording may originate from a radio receiver, varying from a recording of an amateur transmission to a hit tune from your favorite band.

For such recordings it is seldom satisfactory merely to place the microphone in front of the loudspeaker. The inherent distortion of microphone and loudspeaker and room resonance effects generally combine to give very unsatisfactory results.

## SHIELDED LEAD

The preferred method is to take the signal through a short shielded lead from the receiver detector to the pickup channel of the recording amplifier. Care should be taken to avoid as far as possible the undesired

(Continued on Page 95)



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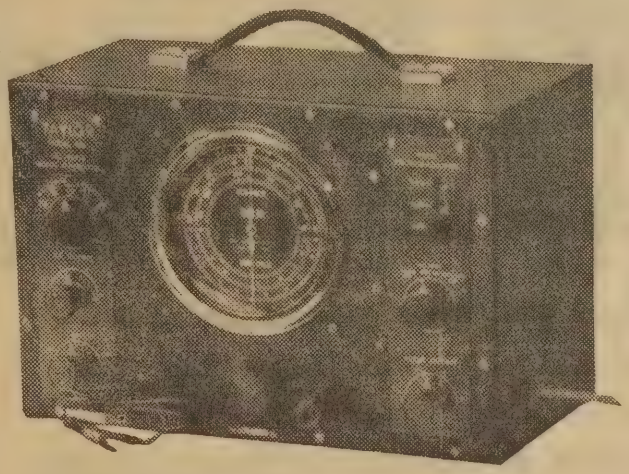
THE 12-inch Goodman speaker is a high quality permagnetic unit, which retails for £14/6/8. The voice coil impedance is 15 ohms and a special multi-tapped output transformer is available, retailing at £3/-/-. Power capacity rating is 20 watts, frequency range 47-5000 c/s and weight, less transformer, is 11lb. 10oz.

The larger 15-inch speaker weighs 30lb, and is fitted with a 2-inch voice coil having an impedance of 3.5 ohms at 400 c/s. The permanent magnet gives a flux density of 15,000 gauss and the power handling capacity is 25-30 watts. With a frequency range quoted as 30-6000 c/s, the speaker retails for £35/13/9.

For small set requirements, Denham's have imported a quantity of AWF 8" speakers. These are of conventional design and average performance, and are intended mainly to relieve the shortage of speakers in this country. Voice coil impedance is 2.3 ohms, so that the speakers can be used either with attached transformer, or with a standard Australian transformer with 2.3 ohm secondary. Retail price is £2/18/6.

The Taylor generator is intended essentially for service work or small manufacturers. It covers the range from 100 kc to 46 Mc. in six bands



and uses a directly calibrated scale. The output may be modulated from an internal or an external source, or, alternatively, operated without modulation. Up to 1.0 volt of audio is available directly for amplifier tests.

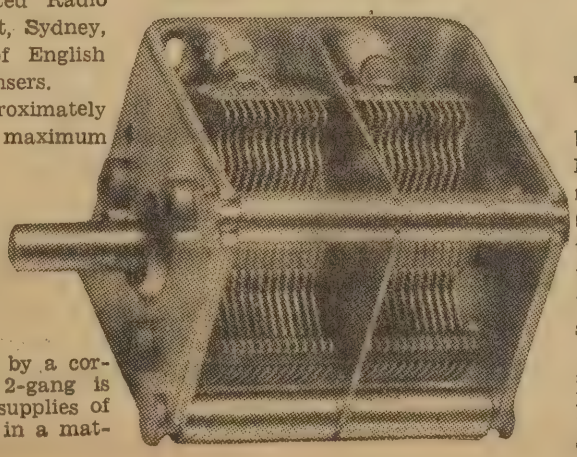
The RF output is controlled by coarse and fine attenuators and mains filters are included to reduce unwanted leakage. The instrument operates from 110 to 200-250 volts ac, and measures 12½" x 8½" x 6". Trade price is £30/9/-.

Limited quantities of the above items are available from stock and further supplies are available on indent. All inquiries should be addressed to Denham's (M'bro.) Pty. Ltd., Maryborough, Qld.

## *MIDGET 2-GANG FROM U.R.D.*

IN line with the current demand for small components, United Radio Distributors, of Phillip-street, Sydney, have imported quantities of English midget 2 and 3-gang condensers.

The 2-gang measures approximately 1¾" x 1¾" x 2" and has a maximum capacitance of 363 mmfd. It is of rugged construction and employs ceramic insulation between the stator plates and frame.



The three-gang is of similar design but has the extra section, which increases the overall length by a corresponding amount. The 2-gang is available from stock, while supplies of the 3-gang will be to hand in a matter of weeks.

## *VALVE DATA CHART*

THE AW Valve Co., of 47 York-street, Sydney has released an excellent booklet containing information on all Radiotron valves, both Australian-made and imported types. In addition to characteristics and socket connections, the booklet contains a classification chart and a comprehensive directory to valve replacements and substitutions.

Copies of this 34 page chart are available only to subscribers to the Radiotron Technical Information Service. No stocks are available for general distribution.

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**A GUARANTEE OF DEPENDABILITY**

## BOOK REVIEW

"REFERENCE Data for Radio Engineers," second edition, prepared by the Federal Radio and Telephone Corporation, New York.

The popularity of the first edition of this book was indicated by the fact that four printings were sold out. The second edition follows the same general lines of presentation, but has been expanded considerably in its scope. Sections on radio propagation and noise have been revised, a comprehensive index added and there are two entirely new chapters on transformers and room acoustics.

The first chapter presents general information tables and formulas not readily classified under chapter heading.

The next section deals with the characteristics of materials, giving relevant formulas and tables. Following that is another section on radio and audio design, referring mainly to the small components.

Chapters 4 to 16 deal with clearly-defined subjects, including rectifiers and filters, iron-cored reactors, tubes and amplifiers, acoustics, wave guides, transmission lines, propagation, antennas and so on.

Each chapter begins with a brief introduction and includes notes and paragraphs to correlate the definitions and formulas, thus preserving some continuity in the vast amount of data presented.

Australian price for this 230-page book is approximately 18/-, plus postage. Our copy from Angus and Robertson, 89 Castlereagh-street, Sydney.

## TELCON R.F. CABLES

READERS will be interested to note that supplies of Telcon transmission cables are now available in Australia. The range includes nine types with a nominal impedance varying from 45 to 300 ohms, and two other cables especially intended for use with microphones.

Types K24 and K25 are balanced twin flat transmission lines with an impedance of 150 and 300 ohms respectively. Both use polythene as the dielectric.

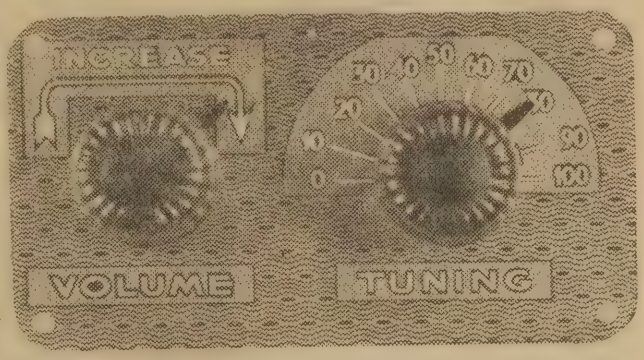
The K24 cable has a capacitance of 10.6mmfd/ft. and an attenuation of from .3 to 2.1 db/100ft. for frequencies between 1 and 50 Mc/s. The velocity ratio is .786 and the power rating 3 k.w. at 1 Mc/s, diminishing to 0.3 k.w. at 100 Mc/s.

For the K25 cable the capicitance is 4.6 mmfd/ft. Attenuation in db/100ft. varies from 0.15 at 1 Mc/s to 1.35 at 100 Mc/s. Velocity ratio is 0.77 and power rating from 4.3 k.w. to 0.5 k.w. for frequencies between 1 Mc/s and 100 Mc/s.

Further information can be supplied by A.W.A. Telcon Pty., Ltd., 47 York-street, Sydney.

# DIAL FOR "HANDIE-TALKIE"

The Efco Company have just released an escutcheon plate especially designed for the "Radio & Hobbies" "Handie Talkie." Supplies are available through all normal trade houses.




THE escutcheon plate measures 3½in. x 1⅞in., the illustration being slightly less than full size. The plate is of heavy gauge metal, with a background pattern of brown and gold, and markings in cream. Two knob positions are provided, one for volume, the other for tone.

The plate is supplied with two small knobs to match, fitted with brass pointers which clip beneath the nut on the grubscrew. A hole is provided in each corner for attaching the plate to the cabinet.

The "volume" position is ⅜in. from the left-hand extremity of the plate, and the "tuning" position is 1⅛in. from the right-hand edge. Although especially intended for the "Handie-Talkie," the plate could be used equally well with other small sets.

# AUSTRALIAN HI-FI PICKUP

In conformity with the most modern trends in pickup design, the new Australian pickup by Hummelstad Harris has a frequency range from 15 to 16,000 c/s and a vertical pressure on the needle point of from 12 to 14 grams.

THE pickup is of the needle armature type and uses a screw-in armature stylus of very low mass. The lateral compliance of the needle point is very high, the pickup being designed with a view to extending the playing time and the frequency response from acetate discs.

Frequency range of the pickup is from 15 to 16,000 c/s, being substantially flat up to 9000 c/s. Thereafter, a gradual rise is apparent to the fundamental resonance of the armature, which occurs at 14,000 c/s. The particular model has an impedance of 500-600 ohms and an output of 10 mV., which approximate a level of —45db.

Playing time of the sapphire stylus is normally about 200 hours on shellac pressings—this before any regrind becomes necessary.

The armature stylus screws into a tiny socket fixed in spring supports, no other damping being necessary.

To insert or remove the stylus, a small brass ferrule is used, being placed over the sapphire end of the stylus. When pressed upwards, it engages a taper with enough friction to enable the stylus to be unscrewed or vice versa.

The arm and head of the pickup are of aluminium, finished in grey and fitted with a counterbalance. Two types of arm are available at present, one for recordings up to 12in. diameter, and the other for up to 17in. discs. The base pedestal is fitted with two ball races and allows for adjustment of pickup height.

Available as extras are mumetal matching transformers, with 14-1 ratio and a lowering jack controlled by a knob and flexible shaft. This makes it possible to raise the pickup and lower it again into the same groove.

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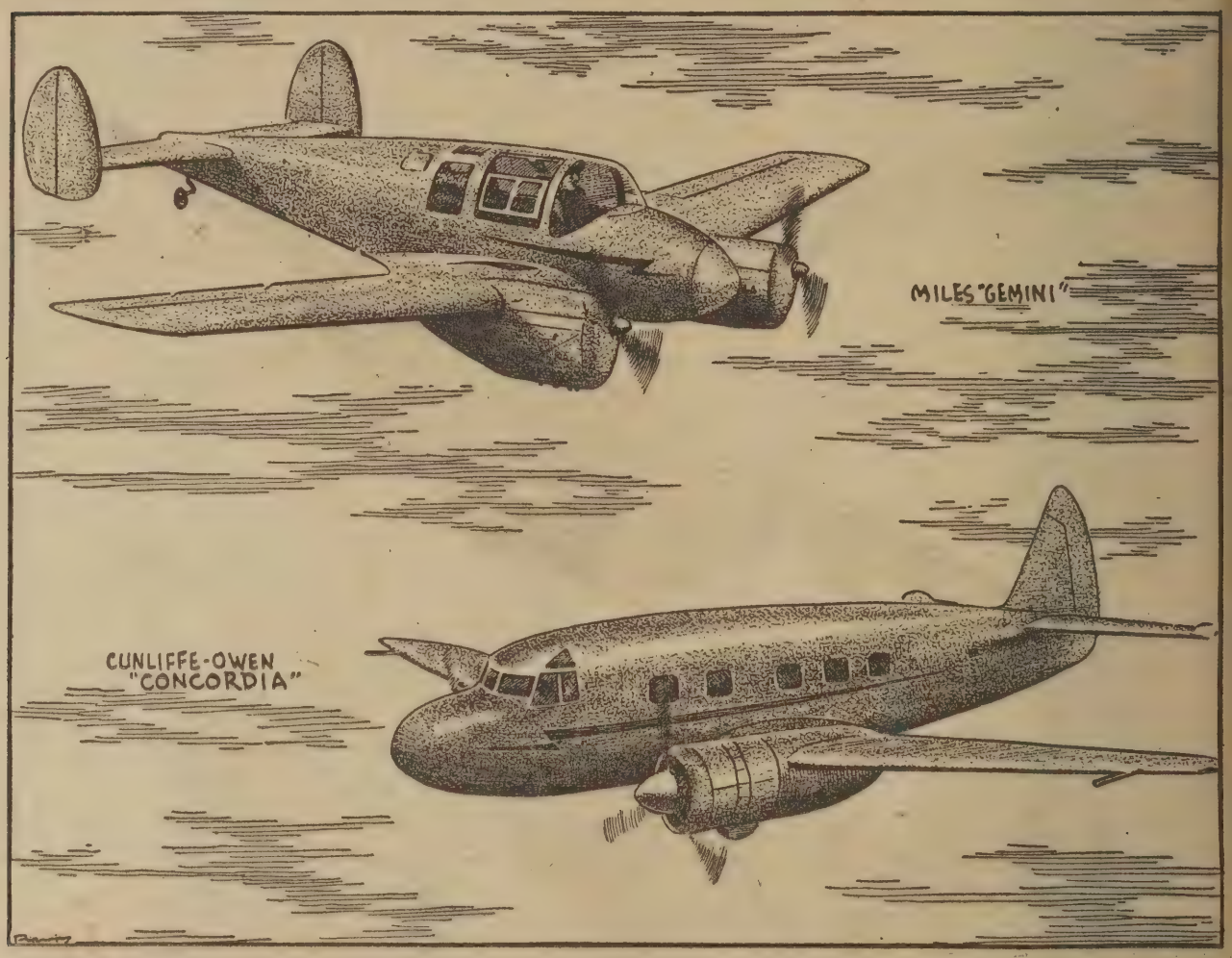
# CROPS DUSTED BY NOVEL HELICOPTER

WORKMEN LOAD AGRICULTURAL DUST into one of the two 200lb capacity hoppers on Bell Aircraft crop duster as the pilot records progress of the operator. Electrically operated dust gates, which are controlled from the cockpit while dust is applied with air from the engine fan, is clearly visible at the bottom of the Hopper. Note the built-in stability bar under the main rotor blade. This unique stabilising bar is joined by a "see-saw" pivot that allows it to turn with the mast. It is linked also to the rotor. The bar is so lightly weighted that it maintains a given plane of rotation at all times—independent of most rotor disc. The device counteracts sudden changes of blade angle caused by gusts or otherwise "choppy" weather.

# FEEDER LINES AND PRIVATE PLANES




**Two interesting British machines are the Miles "Gemini," a light plane principally for private operation, and the Cunliffe-Owen "Concordia," a new feeder-line aircraft. A four-seater, the Gemini (sketched above) is useful not only as a private plane but also for work of air charter companies, taxi service, feeder airline companies and aero clubs. Orders have been received by the Miles company from all these types of organisations.**

BASICALLY, a twin-engined version of the single-engined Messenger designed for observation, liaison and communication duties with the British Army, the Gemini is powered by two 100 horse-power Blackburn Cirrus Minor II's. Each driving a fixed-pitch, two-blade propeller, these give the plane a cruising speed of over 130 miles an hour. Maximum level speed is about 160 miles an hour.

## RANGE 950 MILES

A total of 66 gallons of fuel is carried, distributed over four wing tanks. Average fuel consumption is about eight gallons an hour, giving a maximum still-air range of about 950 miles.

The Gemini can fly at 80 miles an hour on one motor, maintaining height and remaining fully controllable even with full load.

Take-off and landing performance is excellent. With a full flap take-off the plane becomes airborne after a run of about 150 yards. Landing run can be cut to a similar distance.

A low-wing monoplane, the Gemini has double-seat accommodation in both front and rear seats. Vision is excellent, large areas of perspex giving a clear view forward and down. The underwing mounting of the motors aids visibility.

Landing wheels retract into the base of the engine nacelles. The tail-wheel does not retract. Twin fins and rudders are fitted.

Cunliffe-Owen's new 10-12 seater, the Concordia (lower right), is designed to meet the requirement of provincial and feeder-line operators.

The Concordia has a range of 800 miles, but it is primarily intended for stages of from 300 to 500 miles on provincial or feeder-line routes.

Seating is for either 10 or 12 passengers. In the 10-seat version, all seats are forward facing. In the 12-seat version the two front seats face the rear of the fuselage. With a capacity of 510 cubic feet, the cabin has headroom of six feet.

## BAGGAGE

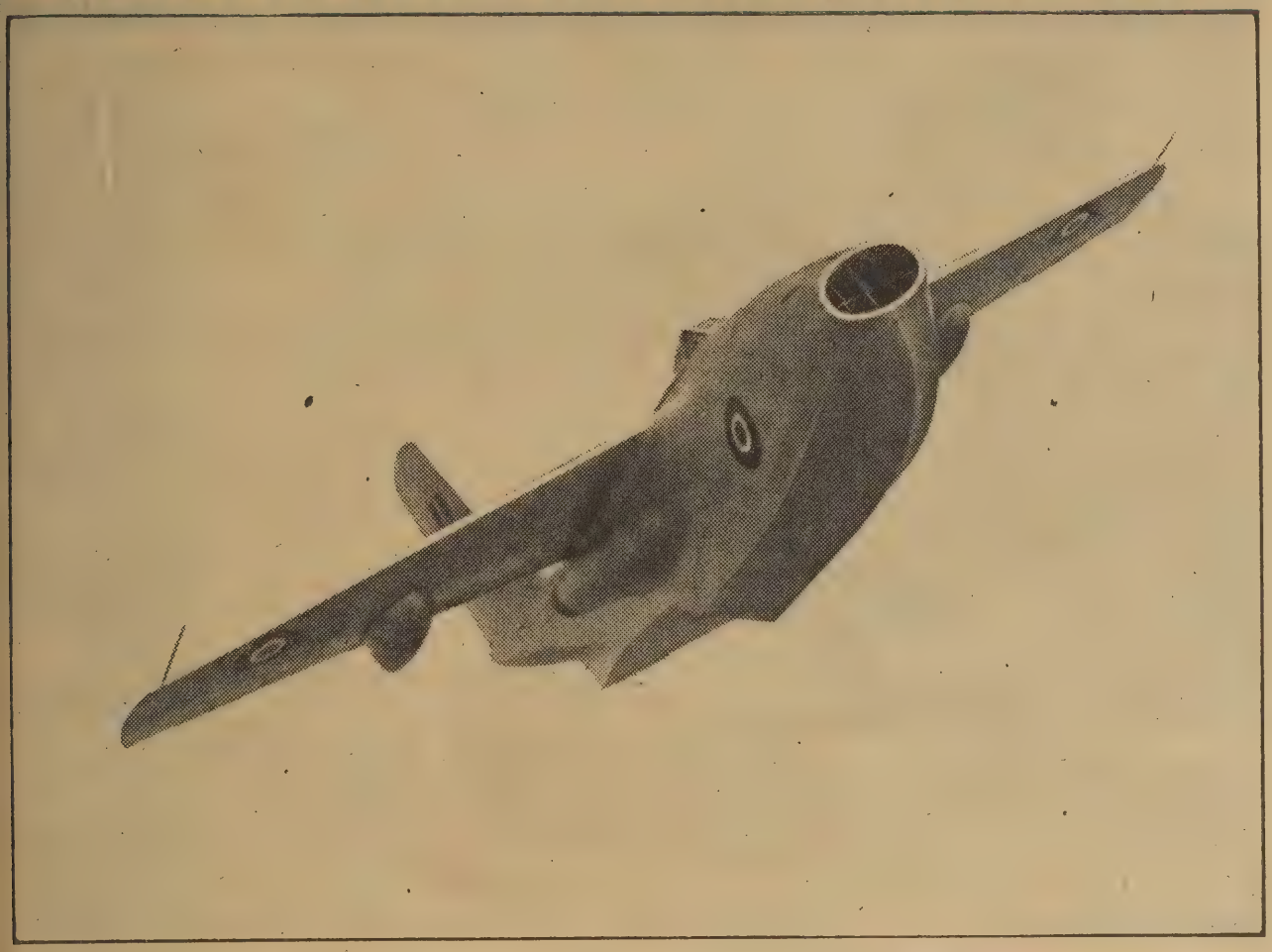
A baggage compartment of 45 cubic feet is provided behind the cabin, allowing for the stowage of at least 450lb. of luggage.

Special portable freight containers to carry 210lb. each, can quickly replace normal passenger seats (one for one) in accordance with day-to-day requirements.

The fuselage is oval in section, con-

**(Continued on Page 83)**

# FLYING BOAT FIGHTER SHOWS SPEED



Successful flight tests of the world's first jet-propelled flying boat, the Saunders-Roe SR-A-1, indicate that it will achieve its 500 mph design top speed without difficulty.

TESTS to date have been held to the 400 mph mark by Geoffrey Tyson, Saro chief test pilot, with water handling characteristics and general stability and control receiving the greater emphasis.

The single-seat fighter is powered by two Metropolitan Vickers F 2/9 Beryl axial-flow turbo-jet engines developing 3500 pounds of thrust each.

They are mounted side by side near the fuselage centreline, permitting single-engine operation with a minimum effect on directional stability.

## ONE-ENGINE FLIGHT

This permits one engine to be shut down for long-range flying and preserves normal control in the event of an engine failure in flight.

The air intake is located in the extreme nose, clear of normal spray, and contains a water trap to prevent the entrance of water in heavy seas.

The cabin is pressurised and fitted with a pilot ejector seat.

The wing floats are retractable below the thin, high-speed wing in a stowed position.

Four 20mm. cannon are mounted in the nose on either side of the intake.

The jet-propelled flying-boat single-seat fighter offers numerous tactical advantages over the carrier borne or land-based fighter.

## EARLY DESIGNS

The United States Navy experimented with single-seat flying boats designed by Igor Sikorsky and Grover Boeing in the early thirties, but abandoned them due to their comparatively poor performance.

Claims that these planes were underpowered now seem justified and turbo-jet engines have overcome any such disadvantages.

The US Navy currently pressed completion of the Convair Skate, a swept-wing small flying boat with 7560lb. thrust jet units.

Span of the SR-A-1 is 46 feet, length is 50 feet, and height is 17 feet.

## DC-6 FIGURES

MORE than seven million flight miles —equivalent to 295 trips around the earth—have been logged on the new DC-6 airliner, Douglas Aircraft Company disclosed recently.

Figures show that the seven million mile mark was reached in mid-August, less than four months after the high-speed, high-altitude transport entered scheduled airline service April 23.

Of this total, 600,000 miles were accumulated in proving flights.

A greater portion of the mileage represented aggregate scheduled service over routes of American and United Air Lines.

In its brief service history, the DC-6 established an imposing number of speed records, including an official transcontinental mark of six hours 47 minutes and 13 seconds, averaging 364 miles an hour between Long Beach, California and New York City, San Francisco to Honolulu in seven hours 42 minutes, and many others.

# PICTURE NEWS OF THE WORLD'S SKYWAYS

Mr. George Miles, the designer, holds a model of "The Project" which is now under development at Miles Aircraft Ltd., Reading, England. Specifically designed for the carriage of mails "The Project" will cruise in the sub-stratosphere at speeds up to 500 m.p.h., landing once every four hours and carrying straight on with a new crew. In this way New York and Montreal would be reached from London in 6 hours, Perth or Sydney just under 22 hours.

## The Hoppicopter

THE Seattle Penticost Hoppicopter, originally designed as a personal helicopter to be strapped on the back of the wearer, now has been developed into a new tripod version, Model 103, which has a more powerful engine, is larger and heavier and is expected to attain forward speed as great as 90 mph.

Still a one man lightweight device, the new Model 103, has modification or tripod landing gear used on the second hoppicopter, a more comfortable seat and major rotor modification.

It weighs 175 pounds as compared to 105lb. for the earlier tripod version, has a 35 hp engine instead of 25 hp powerplant and is 3ft. tall instead of 6ft.

It is estimated to carry a useful load of 250lb instead of 180lb.

The two counter-rotating rotors have increased diameter 16ft. instead of 13ft. 6in., and as an added safety factor are spaced farther apart on the shaft amounting to 25 per cent.

Rigidity of the earlier rotor has been modified to allow a certain degree of blade "flapping" and to permit lighter rotor construction.

The inventor, Horace Penticost, estimates the new hoppicopter will cruise for 60 to 90 minutes on two and one half gallons of fuel.

A service ceiling of 12,000ft., the same for the earlier Model 101, has been fixed as about the maximum hoppicopter fliers wish to attain in the "open-air" flying machine.

★ ★ ★

## Russian Airliner

A NEW Russian airliner in the same class as the Douglas DC-4, known as the Ilyushkin-12, will soon be added to the Russian transport fleet.

Designed for use on long stages of Soviet domestic routes, it has a maximum cruising speed of 270 miles per hour, and a range of 1250 miles.

Good visibility is claimed in the aircraft as a result of the pilot's cockpit being in the extreme nose, combined with a windscreen similar to that of the Boeing Stratocruiser.

Four 1600 hp engines are installed and a single fin and rudder and nosewheel undercarriage give the aircraft a remarkable resemblance to Douglas type aircraft.

It carries a crew of five and has a cargo capacity of three tons.

★ ★ ★

## Weather Ships

ENGLAND has completed conversion of the corvette Marguerite, a weather observer, the first of four British weather ships to be maintained in the Atlantic.

The weather hull is painted black with yellow superstructure.

She will be stationed 300 miles west of Ireland, to report weather and provide navigational and rescue service for aircraft.

## Cost Of Aviation

THE US Senate of War Investigating Committee, which was highly concerned over 21,000,000 dollars cost of the Hughes' 200-ton HK-1 plywood flying-boat, is unduly naive on the cost of experimental aviation.

Lockheed estimates that the first Constitution cost 27 million dollars. The initial Consolidated Vultee B-36 cost over 30 million, while the first two B-35 experimental Flying Wing models cost about 26 million dollars without engines, radio equipment or armament.

Howard Hughes revealed that difficulties with the control power boost system of the HK-1 is the major delaying factor in the initial test flight of the giant flying-boat.

His system uses power boost as the sole control method in contrast to the direct mechanical over side systems as on all other power boost systems as an emergency safety measure.

★ ★ ★

## Ditching Tests

A B-17 Flying Fortress bomber, one of the aeroplanes used in the Bikini atom-bomb tests last year, was recently received at the Curtiss Wright Corporation plant at Columbus, Ohio.

During the atom-bomb test it was one of the aircraft piloted by remote control through the gigantic geyser which followed the A-bomb explosion.

All guns, gun turrets and miscellaneous equipment will be removed and water-proof boxes containing recording instruments will be installed.

It will then be taken to a coastal base, where it will be landed on water and its water-landing characteristics studied.

The entire remodification programme, during which 10 aeroplanes of the B-17 type will be subjected to similar tests, is expected to take two years for completion, in as much as each will be prepared for ditching in a manner different from the previous one.

★ ★ ★

*A specially strengthened Lockheed P80, lent by the United States Army Air Force to the US Navy, has been undergoing extensive tests in carrier landings and catapult take-offs on the USS Franklin D. Roosevelt of the Virginia Capes.*

★ ★ ★

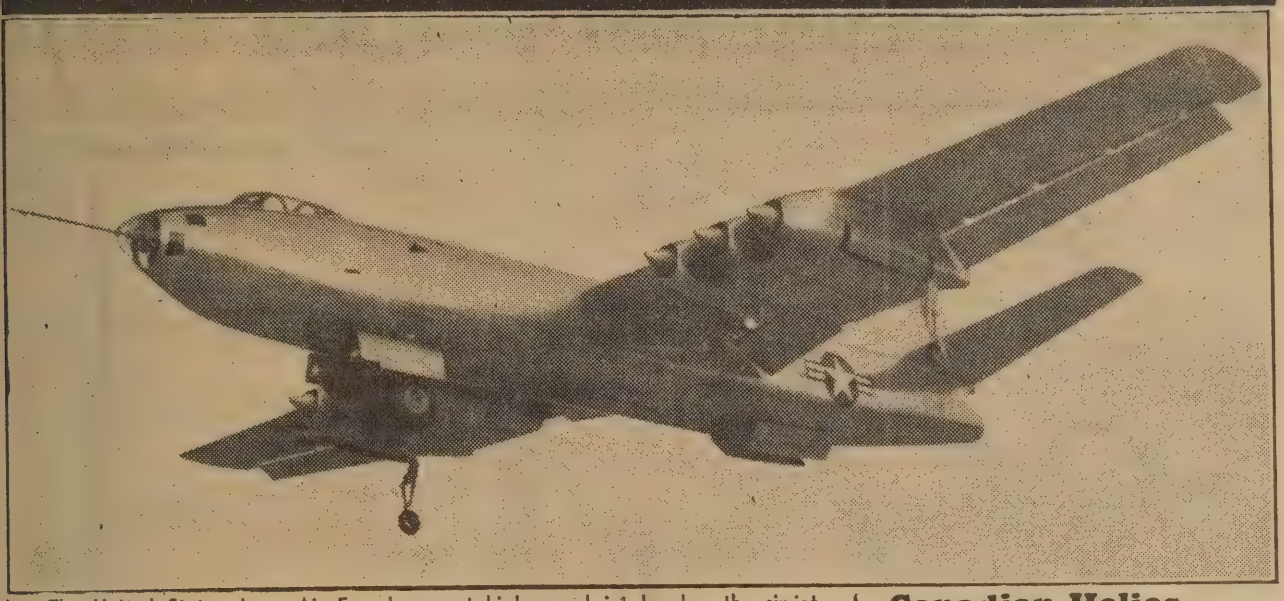
## Hellcat Armor

THE United States Navy has completed tests of two Grumman F6F Hellcat fighters, equipped with .60 calibre machine guns, and reports are being studied.

Tests proved satisfactory and a quantity of the guns is being procured for further service tests.

Decision on replacement of .50's throughout the US fleet units has not yet been made.

# HIGH SPEED SIX-JET BOMBER MAKES TEST FLIGHT



The United States Army Air Force's newest high speed jet bomber the six-jet Martin XB-48, built by The Glen L. Martin Company, Maryland, completed its first flight recently, remaining in the air 73 minutes. It is powered by six General Electric J-35 gas turbine engines, each of which has a total thrust of 4000 pounds or a total thrust of 24,000 pounds, a maximum power greater than that of two great electric railway engines each pulling a string of 125 freight trucks. The craft has a speed of over 480 miles per hour and a tactical radius of over 800miles. A small wheel is located near each wing tip to give stability during ground operations. These wheels fold into the wing but they are small and fit into shallow wells. The new bomber has a wing span of 108 feet, 4 inches; a length of 85 feet, 9 inches and a height of 27 feet, 6 inches. The wing area is 1300 square feet. Its total emply weight is 58,500 pounds and carries a crew of three. The bomb capacity is over 10 tons.

## Commercial Jets

AMERICAN Airlines' laboratory comparison of the United States and British jet engines for possible application to commercial use will be watched closely by airline engineers.

The airlines disclosed recently that it will import the British engines.

Harold Harris, vice-president and C. R. Smith, chairman of the board of American Overseas' Airlines, conferred in Europe a few weeks ago with authorities on jet propulsion.

Mr. Smith cautioned that there is no indication that jet engines will operate effectively in present type commercial planes.

Special aerodynamic problems were encountered when America considered installation of jet power in the Republic Rainbows it has ordered, he said.

"It will take a long time to design and produce jet or gas turbine transports; that is the reason for undertaking our experiment well in advance."

The Rainbows will have reciprocating engines with jet exhaust boosters.

★ ★ ★

## Flying Workshop

BRISTOL Aeroplane Company, Bristol, England, have begun construction of a military version of the Bristol Freighter.

The new version will have a normal gross weight of 37,000lb., slightly more than the civilian model, but its useful load will be about 8759.

As an ambulance plane, the military Freighter will carry 32 patients and six attendants.

Bristol recently completed an order for British European Airways of specially equipped Freighters for use as "flying workshops."

They will be used primarily to deal with grounded or damaged aircraft and carry a lathe, pillar drill, air compressor, special containers for spares and lifting equipment. An auxiliary engine is fitted to drive the machinery.

## Canadian Helios

THE first Canadian built helicopter recently made its first successful test flights.

Built for Intercity Airlines Company, Montreal, by the Engineering Products Company, of Montreal, Canada, it is called S. G. Mark V1.

The new helicopter carries two passengers and pilot with 50 pounds of baggage or freight.

It carries enough gasoline for two hour flights of about 160 miles.

No licenses have yet been issued in Canada for helicopter services, but Intercity Airlines plan to have these helicopters mass produced at Montreal, for a cost of 10,000 dollars per aircraft.

★ ★ ★

*FYI, the name of Consolidated Vultee's new 40-passenger, 300-mph, pressurised medium-range transport, has been changed from Convair-240 to "Convair-Liner."*

## T.R.F. MAJESTIC RADIOGRAM

(Continued from Page 31)

are mounted on the power supply unit, the voltages being conveyed to the main chassis by a suitable plug and cable. It is as well to connect the two 6.3 volt filament windings in parallel—correctly phased, of course—earthing by one centre tap only.

The layout of the main set is clear enough from the photographs. Starting from the rear of the chassis we have two RF amplifier valves, with the tone control valve in front, just behind the tuning dial.

The 6SJ7 voltage amplifier is in the other front corner, with the phase filter splitter alongside it, nearer the gang. The 807 valves are in line behind it.

To align the receiver, trimmers have to be wired across each section of the tuning gang. Tune the set to a station at the low frequency end of the band and set the dial pointer so that is registers correctly with the calibrations.

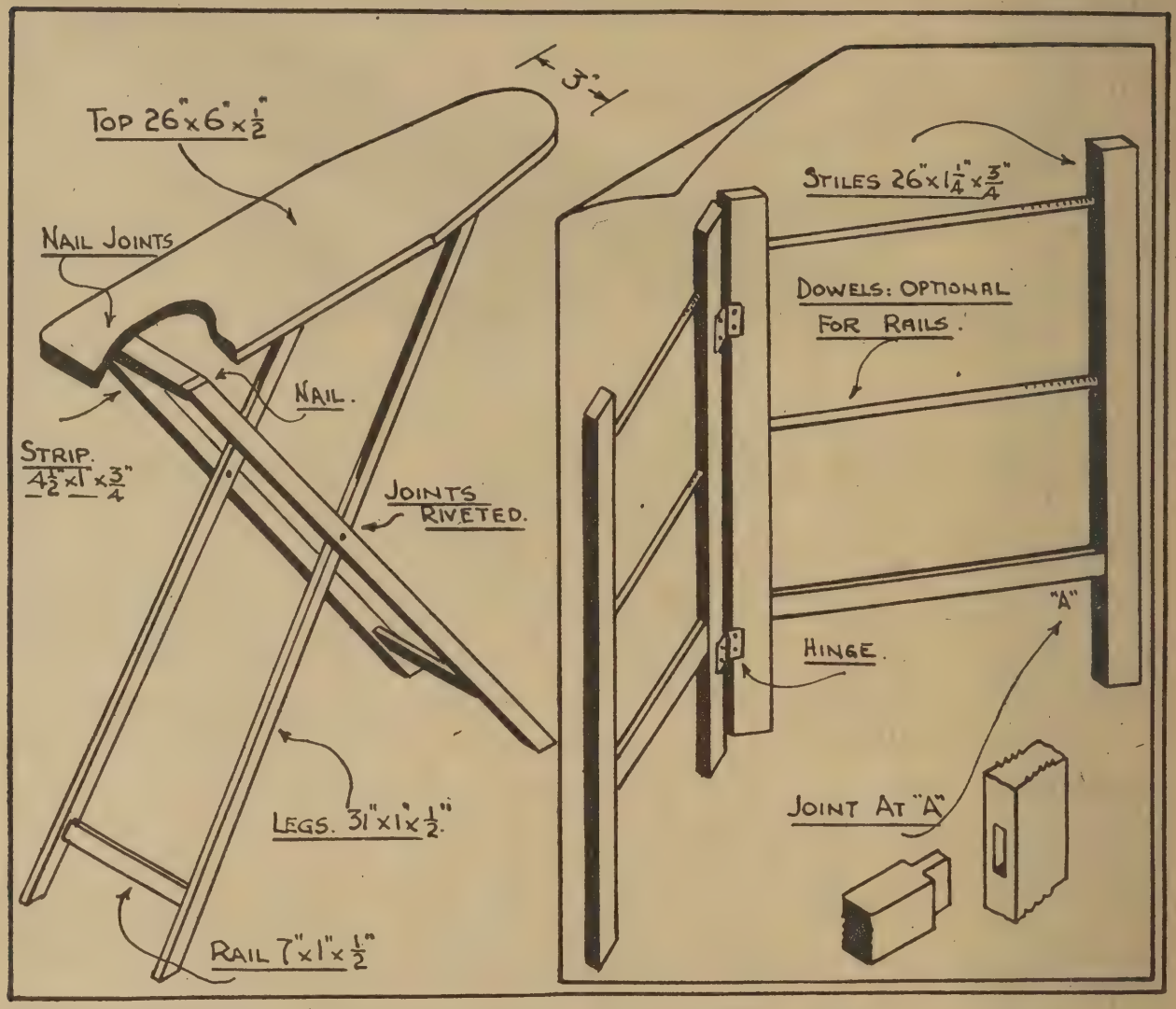
If the coils have variable iron slugs, you can adjust them individually at the low frequency end of the band for maximum sensitivity. Screwing them in will increase the inductance of the coils and affords a further adjustment of the band coverage at the low frequency end.

Now tune to a station at the high frequency end of the band and check on the calibrations. Screwing the trimmers in will tend to shift the stations towards the higher frequency limit of the dial, while unscrewing them will have the opposite effect.

It is often helpful in a TRF set to rock the dial slightly as you adjust the trimmers, since there is some interdependance between the individual tuned circuits and the dial setting.

With due care, there is no reason why the stations should not line up exactly with the dial calibrations, provided the dial has been calibrated for the gang condenser used.

# IRONING BOARD AND CLOTHES HORSE




The two playthings shown will prove a boon to the harassed mother on ironing days and the small daughter will get all the thrills she desires, being busily engaged and out of harm's way in her world of make-believe, while the mother goes on with more serious work.

THE sketch shows an ironing-board and a clothes-horse, both of which can be made readily enough from scraps of wood. Only tentative measurements are suggested in the sketches and in the text, and they can be varied to suit individual cases. The two playthings illustrated were designed to suit a child of between three and four years of age.

## IRONING BOARD

The ironing-board consists of two main parts—the stand and the top. The top piece is quite simple, for it only consists of a piece of ¾in. board 26in. long. Any width will do, but about 6in. will be found a convenient size. Taper one end of this board down to a width of 3in., and round this end nicely to a radius of about 1½in. Also round the two back corners with a saw and file to 1in. radius. Plane all of the faces and sand the top smooth, paying particular attention to edges and corners. If these are made slightly rounded it will improve the appearance.

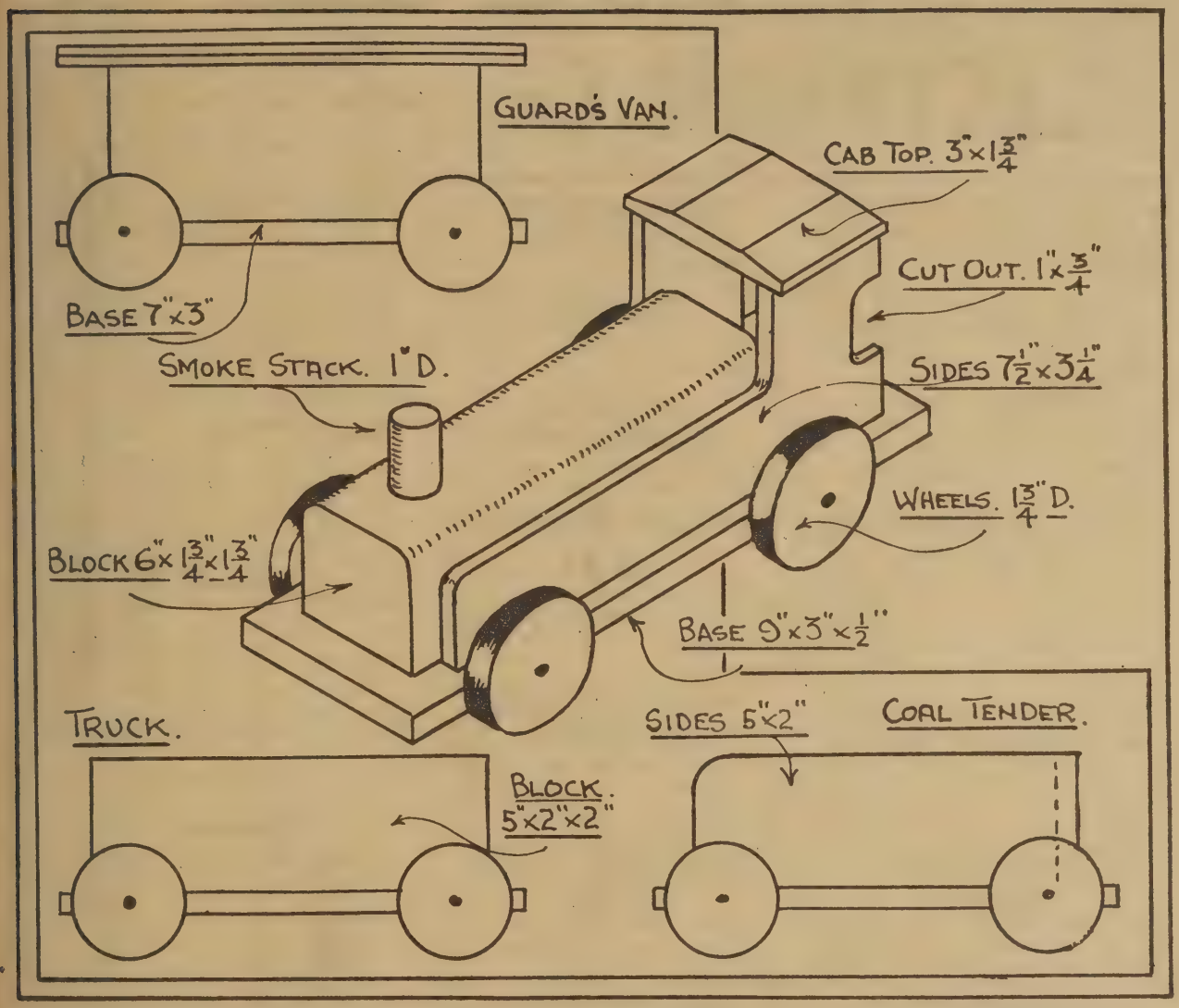
The frame is not much more difficult to make, although it requires some extra pieces of wood. Several strips of timber 1in. x ¾in. are needed. These can be ripped from larger scraps and then dressed to size I used coachwood for this. It is fairly strong, as well as being easy to work. The four legs are each 31in. long, but don't bother to cut them to exact lengths just yet. Two rails are required, 7in. long, and for the top ends two small strips. One of these is about 4½in. long but the other is somewhat less. The exact size can be gained by measuring the tapered end of the top after estimating just where the legs will fit. Now nail the legs, rails and strips together to form two simple frames, one of which will just fit inside the other. A little glue on the joints will make the job much stronger.

Only use one nail in each end of the strips for the tops. Now set up the job in a temporary manner and mark where the leg joints are to be riveted together, and also adjust the strips to the correct angle. Nail the various pieces where required, and saw off any protruding ends of wood.

## FASTENING THE TOP

Place the top in position on the frame, and a couple of nails will hold it firmly. The final step is to set the ironing-board up on a flat surface, say a table-top, placing small wedges under any uneven legs. Then place a pencil on top of a small block of wood (a matchbox will do), and scribe lines around the legs. When cut off to these lines they will sit firmly on a level floor. **(Continued on Page 81)**

# MAKE THIS EASY PULLING TRAIN SET




**For small children toys should be strongly constructed, be painted in bright colors and have freely running wheels. The pull-along train shown features all these advantages and although it bears little resembance to its real counterpart will give more joy to the youngster than more pretentious models.**

THE little set consists of four pieces: an engine, a coal tender, an open truck, and a guard's van. Construction is almost entirely of wood, of which pine is about the best to use. Two sizes of timber, ½in, and 3-8in. thick are needed and there should be little difficulty in getting sufficient small scraps to complete the job.

## THE ENGINE

Suppose we start by making the engine first. Several pieces are required for this, so we will treat each in turn For the base one piece 9in. x 3in. x ½in. is needed. Carefully plane up the faces and edges and sandpaper the whole smooth. The boiler is a solid block 6in. x 1¾in. square. After dressing to size the two top edges are rounded with a file and sandpapered smooth.

Do not attempt to make the rounded edges form a complete semi-circle, for this will destroy the mass effect of the toy. A quick glance at the sketch will show what is required. Next obtain two sides cut from pieces 7½in. x 3¼in. x 3-8in. Dress the wood all round, then tack the two pieces together with panel pins. Mark out the shape as shown in the diagram, not forgetting the cut out in the back edges.

## SQUARE CORNERS

Notice that here the two corners are left square. The exact size of the sides does not matter very much except that you must have the front edges of the cab coming along the boiler about ½in. Carefully saw around the outline with a coping saw and file up any uneven patches, then separate the sides into two. Before assembling prepare a piece of wood for the cab top, 3in. x 1¾in. x 3-8in. Now get your panel pins ready, and some good hot glue, and fasten the various pieces in place. Make sure that the job is square and after punching in the heads of the nails, remove excess glue and set aside to dry.

## CAB TOP

Later the top of the cab can be filed or sanded to a pleasing shape. Also a hole must be drilled 1in. diameter near the front of the boiler to take the smoke stack made from a short length of 1in. broomstick. If the hole is a neat fit glue will be sufficient to hold this piece securely.

Procure four wooden wheels 1¾in. in diameter, made from ½in. timber, and fasten them in place with round head screws. If the holes in the wheels are drilled oversize, the wheels will run all the more freely. Place the screws so that the front edges of the wheels are a little behind the ends of the base.

**(Continued on Page 81)**

# F. N. RADIO & ELECTRONIC Co.

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.01MFD 500v - - - - 6d
.002MFD 2500v - - - 6/-

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# BUILDING A PULL-ALONG TRAIN SET

(Continued from previous page)

The three remaining units, with one or two exceptions, requires similar treatment to the engine for in the first place, each base 7in x 3in. is made of ¾in. wood. The coal tender consists of an open ended box with two sides, 5in. x 2in. x 3-8in., and an end made from the same stuff 1½in. long. After the wood is smoothed up the pieces are glued and nailed together. The box portion is also nailed to the frame. If the front corners of the tender are rounded as shown in the diagram, the appearance is greatly improved.

The truck requires a block 5in. x 2in. x 2in., which can be fastened to the base, or if desired can be made in the form of a box. Two sides 5in. x 2 in., and two ends 1½in. x 2in. are needed if it is decided to make this form. Glue the box together, clean up the edges, then nail it in place on the frame, adjusting it so that it is in a central position.

Similarly the body of the guard's van can be a block or can be built up from a box before it is nailed to the base. As well a roof the same size as the base is needed. Fix this in place and shape it to the same contour as the engine cab top.

Four wooden wheels are needed for each unit, these wheels being the same size as those for the engine. They are also fixed in place with round head screws. After carefully sandpapering each part paint them in vivid colors not to give reality, but to give eye appeal Hence the engine can be blue with a red stack, the coal tender green, the truck red, and the guard's van yellow Following this color scheme all of the wheels should be red.

When the paint is dry some method must be designed to fasten the units together. If the train set is for a toddler it is suggested that the coupling be made from two screw eyes joined together, and thus this will stop the various units from becoming separated. A screw eye in the front of the engine base is useful for attaching a draw string.

But if the toy is designed for a four or five-year-old child, much more fun will be obtained if the set can be coupled or uncoupled according to the dictates of the game. For this a cup hook and screw eye can be substituted for the first method.

The train set forms the basis of a whole group of toys and many accessories such as a station or a signal box can be made by adopting the above simplified method of treatment and construction.

# IRONING BOARD & CLOTHES HORSE

(Continued from Page 78)

**CLOTHES-HORSE.** — The clothes-horse is also of very simple construction, and only requires two frames which are hinged together. The stiles for each frame are 26in. long, and are made from 1in. x ¾in. material. If you cannot get a piece of timber this size, then 1in. or ¾in square stuff will do. Dress the wood to size and clean up the ends, making a slight chamfer on the corners. Now, if the rails are made from the same material, a mortice and tenon joint similar to the one shown will have to be used. The mortice is chiseled out and the tenon is cut with a saw. Three rails are needed for each frame, and when the joints are cut and fit well, glue is applied to them, and the frames knocked together. Strictly speaking, nails should not be used here, but they are a great help in holding the job rigid until the glue sets.

An alternative method is to use ¾in. dowels for the rails. (This is by far the simplest method.) For these, it is only necessary to drill holes in the stiles instead of the mortice joints. Set out the place for these holes on the inside edges of the stiles. In doing this it is best to clamp the pieces together and mark all of the holes at once to make sure that they will correspond. Then with a sharp bit, drill the holes in for a distance of about ¾in.

When the glue has set, clean up the various parts and sandpaper the dowels and any other rough places until the whole is smooth and free from splinters. Two small butt hinges are now needed, and these must be screwed in place on the inside edges of the stiles. These hinges enable the clothes-horse to be folded into a small space for easy storage.


## THE LITTLE GENERAL

The detailed and simple instructions available with our kit-sets for this 4 valve A.C. operated receivers have already enabled numbers of people with no previous knowledge of set-building, beyond the use of a soldering iron, to experience the tremendous pleasure of building their own radio.

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Four valves available at £4/-/10.

*This set was fully described in August issue of Radio & Hobbies.*

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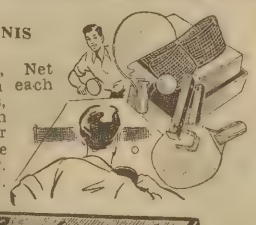

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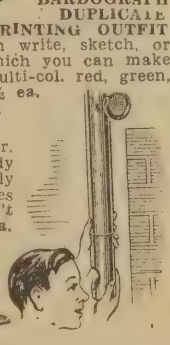

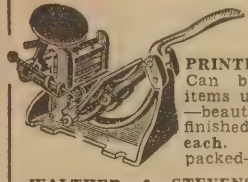

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## The 6-240 Mantel Set

(Continued from Page 47)

centre tap lead directly to the junction. We found that the 100 ohm resistor was preferable to an R.F. choke, and effected a marked reduction in the amount of hash fed to the high tension filter.

Even though the 6X5-GT rectifier is not in use for vibrator operation, the secondary leads are carried up to the plates, and radiate interference above the chassis. Because of this, it is absolutely essential to shield the rectifier valve with a shield which closes in the top as well as the sides of the envelope.

### SHIELD BOX

The final step, which is highly desirable, is to bend up a metal plate, which encloses the whole of the power supply wiring beneath the chassis, and virtually eliminates all direct radiation from the associated wiring and components. To provide for this, it is essential to arrange the wiring so that the filter components and the high tension circuits will fall to one side of the vertical shield, with the audio components on the other.

If you follow this general plan of construction, the chances are that the interference level will be fairly low, and perhaps requiring only minor attention to get it to the near zero level attained in the original set. To remove the last trace of interference there are no hard and fast rules, the procedure being to try to decide just how the interference is being introduced, and then experiment until it is cut down to near zero.

One final point. You will find that the construction of the receiver will be facilitated if you use small-size coils and I.F. transformers, although the larger ones could be fitted in at a pinch.

### ALIGNMENT

The manufacturers of these new coils, RCS Radio, suggest an interesting variation in the alignment procedure. Contrary to usual practice, they advise a variable padder as well as the variable iron slugs.

Lock the dial to the condenser shaft so that there is an equal amount of overlap at each end of the tuning range. Peak the aerial trimmer on the high frequency end of the band, and then tune to some station around about 600 kc. Adjust the padder until the station lines up with the dial calibrations, and then peak the aerial core for maximum response.

Go back to the high frequency end of the band, set the stations to the correct positions with the oscillator trimmer and peak the aerial trimmer again. Repeat the whole procedure as a check on previous adjustment.

If the I.F. transformers have not previously been peaked on an oscillator, carefully check their adjustment on a weak, but steady, signal.

With other makes of coils, the usual alignment procedure can be adopted.

## PRIVATE AND FEEDER AIRCRAFT

(Continued from Page 74)

structed of all-metal shell reinforced by stringers, transverse frames and bulkheads. The wing is an all-metal stressed skin structure.

The pilot's accommodation provides for two crew, dual controls being installed except where an automatic pilot is fitted.

The retractable undercarriage is of the tricycle type. The nosewheel is raised backward and turned so that it lies flat in the base of the fuselage. The main wheels are withdrawn into the base of the engine nacelles. Retraction of both nose and main wheel units is carried out electrically.

Motors are Alvis Leonides LE4M nine-cylinder radials of 550 horsepower each. These are fitted with either Rotol or De Havilland constant speed, full-feathering and reversible propellers.

Maximum speed is 216 miles an hour. Cruising speed at 9500ft. (at 60 per cent. of power) is 194 miles an hour and at 6000 ft. (55 per cent.) 180 miles an hour. Rate of climb at sea level is 1310 feet a minute.

Maximum range in still-air at cruising speed is 900 miles.

Throughout the Concordia, special attention has been given to providing for easy interchangeability of component parts and ease of replacement.

Special uses visualised for the plane as alternative arrangements are as straight-out freighter (with a disposable load of 4375lb.) or an ambulance plane (capable of providing for eight stretcher cases with one attendant).

Main dimensions of the Concordia are: Wingspan, 58ft. 8in.; length, 44ft. 10in.; and height to top of fin, 16ft. 8in. Wing area is 435 sq. ft. and all-up weight 12,500lb.


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# SHORT WAVE NOTES BY RAY SIMPSON

## NEW SCHEDULES FOR AUST. S.W.

### WILL RECENT CONFERENCE BRING RESULTS?

AS from September 29, quite a number of changes were made in the various programmes from Radio Australia. Space does not allow us to cover these, but we mention VLB9 on 9615kc., now used from 6.0 till 7.15 am directed to Britain, and VLA7 on 17800kc., which comes on the air at 7.45 am in the programme beamed to North America. Incidentally, this latter station was supposed to have been VLB7, a new one, but when it opened on 29/9/'47 it turned out to be VLA7.

### ATLANTIC CITY CONFERENCE

A VERY interesting resume of the recent International Tele-communication and Radio Conference was heard in a broadcast from New York. Representatives from 78 countries were present and by means of a new translation receiver supplied to each delegate, the subjects being discussed could be followed by everyone.

The chairman of the conference, Mr. C. R. Denny, of the Federal Communications Commission, gave some interesting facts of the work accomplished and if all the nations agree to abide by the regulations they have now agreed upon, we should have a new era of trouble-free reception without any interference to short wave broadcast programmes.

Various sub-committees have been formed to put into practice what has been determined. Chief among these is the allocation of frequencies to the many different communication organisations, which include broadcast stations, amateur stations, weather, facsimile, frequency modulation, television, radio telephones, weather balloons, taxi services, bus routes, and many other facilities.

Channels have already been allocated to as high as 10,500,000kc. The proceedings of the conference fill over 300 pages of small type, according to one of the speakers, but what we, as listeners, are more concerned with is, will these new frequency allocations be honored in the future?

No mention was made as to whether the USSR attended the conference. This is a very important point, as owing to the multiplicity of Russian stations, and the rather alarming way they pop up all over the dial, if they do not recognise the new allocations we will still have the chaos which exists at the present time.

We have long since given up trying to keep a check on them, as before any information could be put into print, they would have moved to another channel.

Why it is necessary to have so many stations has always puzzled us, but if it really is necessary, why not organise them on some predetermined plan so that one would know when and where to tune them in. This is a non-political criticism and purely aimed at their rather truculent method of hogging the spectrum regardless of who else may have a prior right to that paticular channel. We can only hope for the best in the years to come, when everyone stays put where they are supposed to operate.

### STATION ADDRESSES

PRE9—Ceara Radio Club, SA, Caixa Postal 222, Fortaleza, Ceara, Brazil.

ZFY—British Guiana United Broadcasting Co., Ltd., PO Box 272, Georgetown, British Guiana.

COKG—C/d Estacion de Onda Larga CMKW, Aparto 82, Santiago de Cuba, Cuba.

COKG—C/d Estacion de Onda Larga CMX, Radio Mil Diez, Reina 314 (Altos), Habana, Cuba.

WBOS—Westinghouse Electric Mfg. Co., 275 Tremont-street, Boston, Mass., USA.

WRCA/WNBI—National Broadcasting Co. Inc., RCA Building, Radio City, New York 20, NY, USA.

WCBX/WCRC—Columbia Broadcasting System Inc., 485 Madison-avenue, New York, NY, USA.

Hamburg — Nordwestdeutscher Rundfunk, Rothenbaumchausse 132-134, Hamburg 13, Germany.

XEBT—Radioemissora XEBT, Calle del Bueon Tono No. 6, Mexico City, Mexico.

OIX—Oy. Yleisradio Ab., Porin yleisradioasema, Pori, Finland.

SHORT Wave Notes for the December issue are due on November 1. For the January issue they are due on November 28. Please send them direct to Mr. Ray Simpson, 80, Wilga Street, Concord West, N.S.W.

### A.F.R.S. STATIONS

THESE popular stations have also recently made alterations to their schedules and there are quite a number of changes in call letters and frequency. As these are very popular stations, we will list the calls, times, &c.:—KCBA 15150kc., 1.15 pm to 6.45 pm; KCBA 15330kc., 7 pm to 12.30 pm; KCBF, 11810kc., 1.15 pm to 6.45 pm; KCBF 9700kc., 7 pm to 12.30 am; KGEI 15130kc., 3.30 pm to 8.30 pm; KGEI 9530kc., 8.45 pm to 12.30 am; KGEX 17780kc., 3.30 pm to 6.45 pm; KNBX 15330kc., 3.30 pm to 6.45 pm; KWID 11900kc., 3.30 pm to 9.30 pm; KWIX 9570kc., 1.15 pm to 6.45 pm; KWIX 11890kc., 7 pm to 12.30 pm. Most of these outlets are heard at excellent strength.

## NEW STATION LOGGINGS

| Call | KC | Metres | Location | Time Heard |
|---|---|---|---|---|
| WLKS | 6065 | 49.46 | Kure, Japan. | 8.00 pm. |
| KZRC | 6130 | 48.94 | Cebu, Philippine Is. | 8.00 pm. |
| Fort de Kock | 7200 | 41.67 | Sumatra, East Indies. | 9.0 pm. |
| KZFM | 9515 | 31.53 | Manila, Philippine Is. | 9.0 pm. |
| WLWL | 15200 | 19.74 | Cinicinnati, Ohia, U.S.A. | 8.30 am. |
| CR6RL | 15900 | 18.87 | Luanda, Angola. | 6.30 am. |
| LLN | 17825 | 16.83 | Oslo, Norway. | 8.0 am. |
| WNRX | 21730 | 13.81 | New York. N.Y., U.S.A. | 8.00 am. |

## FLASHES FROM EVERYWHERE

**FRENCH INDO-CHINA.** — The well-known Indo-China station, Radio Saigon, moved into their new studios on September 6, and these appear to be very modern. According to the DX session from Radio Australia, Radio Saigon will shortly inaugurate a 'Listeners' Letter Box session, which will be given at 8.15 pm Eastern Australian time. In this session, listeners' letters will be answered over the air.

For some time now we have been hearing a French-speaking station on 6095kc. till closing at 10 pm. From advice we have received from Graham Hutchins we think that this may be Radio Cambodia, though it is listed as 6035kc., and was supposed to be on 6120kc. Once we heard announcement, "Radio Francais."

**ENGLAND.**—As from October 5, the BBC have retimed their Pacific service and it can now be heard at the following times from these stations:—GVZ 9640kc. and GRX 9690kc., from 4 pm till 7 pm; and from GSN 11820kc., GSI 15260kc., GRQ 18025kc., GRD 15450kc., and GVS 21710kc., from 4 pm till 8 pm. It would appear from some of the American magazines that the BBC is now using an additional transmitter in the 11-metre band, but at time of writing we do not know which one it is. As there are not many listeners who hear the 11-metre channel too well, it will not be of any great importance, though we will advise the call when we find which one it is.

**SPAIN.**—It has always been difficult to keep track of the Spanish stations as they wander in frequency so much. Thanks to the latest issue of "Universalite," however, we show below the position as at June last. Radio Nacional de Espana, Madrid, 9370kc.; Radio Falange de Alicante, 7960kc.; Radio Club de Teneriffe, Canary Isles, EAJ43 7558kc.; Radio Seu, Madrid, EDV10 7150kc.; Radio Falange de Oveido, Oveido, FET15 7035kc.; Radio Mediterraneo de Valencia, Valencia, 7037kc.; Radio Nacional de Espana, Malaga, 7024kc.; Radio Nacional Sindicalista de Valladolid, Valladolid, FETI 7005kc.; Radio Tetuan, La Vox de Espana en el Norte Africa, Tetuan, 6067kc.

**PORTUGAL.** — We are also grateful to "Universalite" for details of the Portuguese stations now on the air. These are:—CSW 11027kc., 3.30 am till 6.30 am, 7 am till 9.0 am, to Africa and Brazil; CSW7 9724kc., 10 am till 11.30 am, to North America; CSX 12750kc., 9 pm to 11 pm, to adjacent islands; CSX 6374kc., 3.30 am to 9 am, to adjacent islands; ERA 4845kc., Azores, 7 am to 9 am, 7018kc., 5 am to 6 am, to the Continent; ERA 11090kc. was listed as not operating, but as we go to press we have heard them again just before 7 am. Of the above stations, CSX 6374kc. and CSW 11027kc. are both being heard well around 6 am, but we can find no trace of the 12750kc. or 9724kc. outlets.

**DID YOU HEAR?**—HI2T on 7275kc. around 7 am—Australian stations "Moonray" and "Leisurely" talking to each other on 6235kc. at 10 pm—XECC opening up at 9.45 pm on 6185kc.—Noumea back on its old frequency of 6108kc.—OLR3A with its news in English at 6.45 am—Leopoldville back on 9745kc. with English session and announcing as OTC2—one of the Indians back on 6110kc. around 11.30 pm—a new Indonesian station on 11770kc. at 11 pm, but no English—Saturday night dance programme from XGOY on 11915kc. around 11.30 pm—Excellent signal from XEHH at midnight on 11880kc.—New Chinese station on 11640kc., which sounds like XTMA—Listeners' Mail Bag session from HCJB on 12455kc. Saturdays at 1.30 pm—The good signal from JKE on 9605kc. till closing around 6.50 pm—A new Paris station using 18300kc. from 4.30 am to 5 am with a special session, "Ce Soir en France," for relay in North America—Berlin giving Press reports to New York on 14400kc.—That Batavia is to increase its power to 50kw.—The News in English at 5.30 am from Radio Libre Roumania on 6200kc.—The DX session from Radio Australia at their new times—Pietermaritzburg relaying the BBC news at 6.45 am on 4878kc.—USA weather station on 4765kc., giving synopsis at 10.45 pm—Melbourne police radio calling patrol cars on 4820kc. at various times—HEU6 on 15315kc. with their session to Latin America at 8 am—The talk on the International Tele-communications Conference from New York on October 6.

# NEW STATIONS ON THE BANDS

## PHILIPPINES—SUMATRA—NORWAY

**PHILIPPINE ISLANDS.**—Short-wave broadcasting appears to be rapidly expanding in the Philippine Islands, as during the past month we have heard two new stations on the air. The first one was KZFM, which comes in on 9515 kc and is audible at fair strength from around 8.0 pm. On the hour they make the announcement: "You are tuned to KZFM, 'The People's Station,' Manila, on 710 kc and 9515 kc." On Wednesday nights they have a programme dedicated to veterans of the war, and this is followed by "Starlight Serenade," which carries some good musical items.

The other station recently heard is KZRC, "The Voice of Cebu," which comes in quite well on 6130 kc. This is actually not a new station, as it was heard before the war when it was on 6105 kc, but it will be a new one for listeners who have only taken up the hobby during the past few years. At 10.30 pm they give a very good news bulletin in English, and this is followed at 10.45 pm with orchestral numbers until 11.0 pm, when they go over to the Filipino language. They announce the station as being operated by the Cebu Broadcasting Co. On some nights it is rather difficult to separate them from VLR2, when the latter is spilling over from 6150 kc.

**JAPAN.**—The well-known BCOF station WLKS has now changed frequency from 6105 kc to 6065 kc, where it is heard at much better strength. In addition to changing frequency, the station now remains on the air until 11.30 pm, instead of closing at 8.0 pm, as was the case when they were on their old frequency. Thanks to Sergeant Morehead, of Kure, we received a copy of WLKS programme schedule, which gave us a good idea of what their programme consists of. At 7.0 pm they usually take the programme from Radio Australia.

**ANGOLA.**—Thanks to the DX session from Radio Australia, we heard details of another of the Angola stations. This new one is CR6RL, and it can be heard on most mornings using a frequency of 15,900 kc. It is only during the last fifteen minutes of their transmission that they reach reasonable strength, and the station usually closes at 7.0 am, when the call letters are announced, also another call which is probably CR6RA, the other outlet on 9470 kc, which, when heard, is in parallel with CR6RL. These stations are operated by the Radio Club of Angola, and they are located in Luanda.

**SUMATRA.**—For many weeks now there has been a station on 7200 kc which has defied identification beyond the fact that the language is Dutch. The general opinion is that it is located at Biak Island, while others think it to be at Hollandia. Once again, thanks to Art Cushen, who enlisted the aid of a Dutch-speaking friend, we can now give its location as Fort de Kock, on the east coast of Sumatra. This station comes in quite well on most nights, playing popular recordings till 9.30 pm, when it leaves the air. Perhaps before long we may be able to give the address of this one, as we know there are a number of listeners who wish to send off reports. Later.—We have now heard location is Boeketigi, Sumatra, so it is still a puzzle.

**NORWAY.**—While listening on the 16-metre band recently around 17,820 kc, we heard what we took to be CKNC in their programme directed to Norway, as all announcements were in a Scandinavian tongue. On checking the frequency carefully, however, we found it to actually be 17,825 kc, and at 8.0 am we were able to identify it as the Norwegian station LLN. This was confirmed by comparing the programme with LKV, on 15,170 kc, and, sure enough, they were in parallel. We do not remember seeing this station reported previously, so put it in as a new one. The above is an excellent example as to how careful you have to be with your frequencies, as 5 kc made all the difference in this case.

# THIS MONTH'S VERIFICATIONS

**YV5RU, VENEZUELA.**—Art Cushen sends us details of this verification, which, he says, is one of the finest he has ever received. It is an oblong card with a red background, faded into brown at the top and down the sides. The station slogan, Ondas Populares, and a microphone are across top of card, and at the bottom are the station calls, YV5RG and YV5RU, Caracas, Venezuela, affiliated to the CBS. Large circles radiate from the mike to the top of the card, and in the brown is shadow work of a male and female vocal at the microphone, with musical notes, &c. The power of this station is 5000 watts and the frequency 4880 kc.

**MONTE CARLO, MONACO.**—Another very interesting verification recently received by Art Cushen is one from Radio Monte Carlo verifying his reception on 6130 kc. In their letter, which was written in French, they stated that this was their first report from Australasia, which is a very fine achievement by Art. With their letter they also sent two photographs and a verification booklet. They also advised that they will be increasing their power from 300 watts to 25 kilowatts in November, 1947, so this should enable Australian listeners to log this station, which will be another new country to the list.

**PRE9, BRAZIL.**—Our report to this station was first sent in July, 1946, and was followed up by two other letters, and at last we have received our verification, which came by air mail and consisted of a nice letter in English from the station manager, Senor Paulo Cabral, who said: "We have checked and found in accordance with our files all the details mentioned in your reports. Please accept our best, and we hope to hear from you in the future." Other listeners who have not written to this one should, therefore, have no hesitation in doing so now. Station is operated by Ceara Radio Club, SA, and is on the air from 1100-1400, 1800-2100, Rio de Janeiro time, on 6105 kc, and from 2100-2230 on other frequency of 15,165 kc.

**NW DEUTSCHER RUNDFUNK.**—Once again we have to thank Art Cushen for details of this verification, which was a long letter in German, which stated they were using 50 kw on 6115 kc. Their schedule was given as 2.0 pm to 8.0 pm, with an English period from 6.30 pm to 7.0 pm. Art was particularly pleased to know that his was the first report the station had received from Australasia. The transmitter of this station is located 30 km north-west of Hamburg. Before very long we should be hearing of some Australian listeners receiving their verifications from this station, as we know of quite a few reports which have been sent out.

**XMAG, NANKING.**—Quite a few readers seem to be receiving their verifications from this Chinese station, which is operated by the American authorities. They give their schedule as 1.0 pm to 1.0 am daily, except Sundays, when they open at 10.0 am. On 4275 kc they use a Collins 1000-watt transmitter with a half-wave antenna bearing on Shanghai. Their letter of verification is signed by Paul W. Laisure, station manager, and the address is SSO, Army Advisory Group, APO 909, c/o Postmaster, San Francisco, Cal., USA. If you have not already received your verification from this one, listen for them any night on 4275 kc, as they are usually quite good.

**KZOK, MANILA.**—The Philippine Broadcasting Corporation are to be commended on the fine verification card which they are sending out confirming reports on KZOK, on 9690 kc. The card is in black and white, with the call letters in red right across the card. At the top they have their slogan, "Ang Tinig Ng Bayan," The Voice of the Nation. Broadcast band frequency is 1000 kc with 1000 watts.

**VIENNA, AUSTRIA.**—At last we hear that verifications are coming in from Vienna more freely, and Art Cushen advises in his last letter that his verification letter was from Dr. Siegmund Guggenburger, Public Administrator for the Austrian Broadcasting System.

# WITH OUR S.W. REPORTERS

## ARTHUR T. CUSHEN, OF N.Z.

THIS month we introduce the leading all-wave listener from across the Tasman, Arthur Cushen, of Invercargill, who has been a contributor to these pages since the publication commenced, and who is known far beyond Australia in connection with his DXing.

Arthur first commenced his DX activities in 1937, using a 5-tube commercial receiver, but it was not until early 1939, due to an eye infection that made outdoor sport impossible, that he began DXing in earnest. In these nine years over 2200 stations have been reported, and just on 1300 verified in 100 countries. This is understood to be the largest number of commercial verifications held by any listener in Australasia, if not the British Empire. These verifications cover such a variety of stations it is hard to differentiate between them, but a selection of the lower-powered ones are CHNX, CMZI, HI2G, PZX, HHBM 9665kc, HCJB 4107kc, TGQA, HC4EB, HJCT, ZP14, ZFY, NCLG, NICO, KZEG, ZNR, XZZ, JODK, CR8AA, Wien 1, KOFA, XRAY, TI4NRH YV1RV, HI1J, CP3, CP48, CS2WI, CR7AB, CKFX.

A leading light in the New Zealand DX Club, Inc., Arthur has been short-wave Editor of the club's bulletin since its inception in 1939. Married in 1946 and moved to a new location four doors from his former post, he has proved that by extensive antenna arrays good DX can be had on both broadcast band and short wave, and in the former section he has 460 verifications from stations in every continent, 750-watt Europeans down to 250-watt North Americans.

### RECEIVER

His present receiver is an English model 8-tube superhet, covering from 330 to 33,000 kc, while the antenna systems include a Beveridge directional, bearing 52 degrees, length 650 feet, and a multiple doublet bearing 340 degrees. This latter is of BBC design and is beamed on London and used mainly for reception of these stations. Arthur gets great enjoyment in being Observer in the Dominion for both the BBC and the CBC of Canada. A 50-word cable is sent each week to the BBC giving observations on their transmissions beamed to the Pacific, and, in their own words, Arthur is their main link with the Antipodes. Much ground work was done before the CBC South Pacific service began, and Arthur was asked for an opinion as to which frequencies should be used, and the possible interference which might be expected. Several cables have been received, and most of the technical data is handled in Invercargill. Each week a graph on the transmissions is mailed to Montreal, as they place great reliance in the reception in Invercargill, as it gives a better idea of the average listeners' receiving conditions, as against reception at Government monitoring stations.

### WAR ACTIVITY

The club's Prisoner of War and Monitoring Division, formed in the war years, with Arthur as Officer in Charge, did great service, over 6000 messages being passed on from POW broadcasts from enemy stations, and the hundreds of letters received from all over Australasia show how much this work was appreciated. In the same respect, the quarter-million words monitored from enemy broadcasts met with glowing comment from the Department concerned. The War Department in Washington was also kept informed on specific information they required.

This very energetic listener is also representative in the Dominion for the International League of Short Wave Editors, representative for the Short Wave News, and many other well-known clubs and organisations. Arthur also compiles a world-wide station list which is published annually in Wellington.

In conclusion, Arthur says: "Let our hobby be a great adventure, and show all by our co-operation and helpfulness to all radio stations and listeners that we gladly give of the knowledge we have, in making reception, transmission and our reports of interest to all. I thank Ray Simpson for his close co-operation, and assure you all of my continued support to this fine publication."

# EUROPEAN SUMMARY

## SOME DETAILS OF WELL-KNOWN STATIONS

THIS month we will attempt to give a summary of the European stations, but, owing to their great number, it will, of course, not be possible to cover all stations in each country.

**ANDORRA.**—So far this country has only given us one station, that being Radio Andorra, which operates on 5990 kc or thereabouts. It can be heard any morning before breakfast, and identification is easy, as they quite frequently give location. Both male and female announcers are heard, and it verifies reports quite promptly. This country is one of the smallest in the world and is located between France and Spain.

**ALBANIA.**—Here again there is only one station which can be heard regularly, and this is ZAA, located in the capital, Tirana, and using 7850 kc. This, too, is a morning station and comes in quite well in some locations around 7.0 am, though at our location it is heard at better strength a few hours earlier. Verifications can be had from this one, though they are a little slow in arriving.

**AUSTRIA.**—In the years before the war this was quite an easy country to log through their station, OER2, but now it is a little more difficult. The only outlet we have heard recently is Vienna, on 11,780 kc, around 4.0 pm, and also at 7.0 am on 7180 kc.

**BELGIUM.**—Rather a hard country to log at the present time, the best one being their outlet in the 13-metre band. At other times they can sometimes be heard on 17,845 kc late at night, though never very loud. Some months ago we heard ORY3 on 11,893 kc during their test programmes while years ago they also used to be heard on 10,330 kc over ORK. Once again we can tell listeners that these stations verify listeners' reports, which we know will be good news.

**CZECHOSLOVAKIA.**—The Czechoslovakian stations in Prague have always been popular in this country, and at the present time OLR3A, on 9550 kc, can be heard quite well around 7.0 am. Their other outlet, OLR2A, on 6010 kc, has now been discontinued, but they are also using OLR4A in the early hours around 4.0 am, when an English programme can be heard. OLR5A is another of their stations and operates on 15,230 kc, but we understand is off the air at the present time.

**DENMARK.**—No reports have been received for a long time now on any of the Danish stations, though OZU, on 7260 kc, is supposed to be on the air around 5.0 am, while OZF, on 9520, is reported from the USA as being logged at 3.0 am. Many years ago now we used to hear OZH2 on 15,320 kc with their special Sunday night programme, which could often be logged at quite nice level. Danish stations used to verify in the past, and we expect they still do.

**EIRE.**—Over the past years we have had very few reports of reception of the Radio Eirann station, located in Athlone. A long time ago we managed to obtain our verification for their 9590 kc outlet, but, despite numerous reports, they never replied to our letters concerning their 17,840 kc transmissions. Only recently we read in an American magazine where a listener located in Eire said, despite a letter from the authorities saying they were on the air, he was unable to hear them.

**FINLAND.**—There are quite a number of stations located in this country, one of the best being OIX1, located in Helsinki, and using 6118 kc. Up till a few weeks ago was heard around 7.0 am. OIX2, on 9495 kc, can still sometimes be heard in the late afternoon, but is hard to separate from other stations. This is also the case with OIX3, on 11,780 kc, and, now that Vienna is using this frequency, the Finnish station is completely blotted out. Other frequencies are OIX4 on 15,190 kc, and OIX5 on 17,800 kc.

**FRANCE.**—The French stations are now beginning to reach their prewar strength again, and no difficulty should be experienced in tuning in Paris on either 7240kc, 7280kc, 9520kc 9550kc, 9560kc, 9620kc, 11,700 kc, 11,730kc, 11,840kc, 11,885kc, 15,240kc, 15,350 kc, or 17,850kc, to mention only some of their channels. Of late these stations have been very slow in verifying, though they send quite a number of letters asking for reports.

**GERMANY.**—Prewar listeners will remember with what strength the German stations used to be heard, but nowadays they do not seem to reach anything like the same level. The stations operated by the various military controls have been heard on quite a number of channels, the best of them being Munich, which uses 6080kc, 7290kc, 9540kc, and 11,870 kc. They also announce a 19-metre band outlet, but so far we cannot find it. Leipzig, on 9730 kc, is also quite good in the late afternoons and mornings, while there is also Nord West Deutscher Rundfunk, in Hamburg, which can be heard any morning using their channel in the 49-metre band, 6115kc. The above are the best at the present time but others will probably commence before very long.

**GREECE.**—A few months ago there was no difficulty in logging Athens on 7295 kc at 6.15 am, when they gave a news session in English. We understand this station is at present off the air, but will soon return. Another Greek station is SVM, on 9935 kc, which is controlled by Cable and Wireless, Ltd., and when on the air in the very early hours is excellent strength, giving news relays to the BBC, London.

**ITALY.**—Two of the Italian stations, Busto Arsizio I and Busto Arsizio II, on 9630 kc and 11,810 kc, are now being heard quite well around 7.0 am, and then there is the new outlet on 7250 kc also heard, but much weaker. Other frequencies will probably be used later.

**ICELAND.**—This always seems to be a country much sought after, especially by new listeners. The only station operating from these is TFJ in Reykjavik, which is assigned to 12,235 kc. Some sources say this station is not being used, while others give its schedule as midnight, Sunday, till 12.30 am, Monday. If you should hear it, send them a report, as they definitely verify, or, we should say, used to.

**LUXEMBOURG.**—Another interesting country which has been heard consistently over the past few months on 6090 kc and during the past weeks on 9527 kc and 15,350 kc, carrying out test transmissions. The best outlet is still 6090 kc, and on Monday mornings English is frequently heard.

**NORWAY.**—Scandinavian stations have always been of interest in this country, and Norway gives us quite a choice. At present it is possible to hear LLI in Oslo using 6185 kc around 6.0 am. LKC, on 9535 kc, can sometimes be logged at 8.30 pm, while a few Sundays ago we heard LKQ, 11,735 kc, in the late afternoon at surprisingly good strength. Other channels are LKV, on 15,170 kc, and an experimental one on 6200 kc which was located in Klofta. LLN, 17,825kc, also now being heard.

**PORTUGAL.**—A really good station is CSW, on 11,027 kc, which comes in well around 6.0 am, as also does CSX, on 6375 kc. CSW7, on 9725 kc, is also supposed to be on the air in parallel with CSX on 12,750 kc, but these are not audible at our location.

**POLAND.** At the present time there is only one Polish station being heard, this being Warsaw on 6114kc, which can be logged with careful tuning from around 6.0 am. Its frequency must be slightly lower than 6114kc, as when heard it is clear of Hamburg on 6115kc. In prewar days we used to have SP48 on 6140kc., SP31 on 9525kc., and SPW on 13653kc. These stations used to verify with a very attractive card with large call letters, but Warsaw now sends only a letter of verification which is, of course, also appreciated.

**RUMANIA.** This country has previously been rather difficult to log but during the last few weeks Radio Libre Roumania on 6210kc. has been heard at quite good strength at 5.30 am when English is used. The station closes at 6 am with the playing of an anthem. The location is Bucharest, the capital, where also is Radio Bucharesti, which operates on 9250kc. and heard occasionally around 5 am, but never at any great strength and usually suffering from severe Morse interference.

**SWITZERLAND.** Stations in this country need no introduction to Australian listeners as they have been heard on many different frequencies at excellent strength. Among the best at the present time are HER3 on 6165kc., heard both in morning and late afternoon, HER5 on 11865kc., together with HEU5 on 11815kc. with their special sessions directed to Australia and New Zealand. At 8 am another of these stations, HEU6 on 15315kc. can be heard with programme in Spanish directed to Latin American listeners.

## READERS REPORTS

WE have to thank the following readers for their letters giving details of their reception during the past month:—

Mr. J. Saunders, Bondi Beach, NSW; Mr. M. Krumbeck, Carlton, NSW; Mr. R. M. B. Brownrigg, Christchurch, NZ; Miss D. Sanderson, Malvern, Vic.; Mr. Art. Cushen, Invercargill, NZ; Mr. R. MacCarthy, Gympie, Qld.; Master P. Kayser, West End, Qld.; Mr. N. Harper, Emu Flat, Vic.; Mr. J. T. Gould, Ohakune, NZ; Mr. D. Smalley, Christchurch, NZ; Mr. R. Clack, Punchbowl, NSW; Mr. H. R. Cox, Cobden, NZ; Sgt. E. K. Morehead, BCOF, Japan; Mr. T. J. Phillysson, Rockhampton, Qld.; Mr. G. A. E. Major, Manjimup, WA; Mr. J. Stonhouse, Dunedin, NZ; Mr. R. O. Block, Petersham, NSW; Master R. Rooke, Manly, NSW.

# A FEW EXTRA CARDS FROM THESE!

Verifications have been received by the following readers as shown:—

Mr. Art Cushen: YV5RU, Monte Carlo (1st Australasian report), N.W. Deutscher Rundfunk Hamburg (1st Australasian report), CFRX, KRHO 15250kc., Capetown 5880kc., CR7AB, CR7BV, SEAC 17770kc., HER4, HER5, HER6, Singapore 4820kc., CE622, CE1173, XMAG 4275kc., Saigon 11780kc.

Mr. M. Krumbeck: WLWK 9590kc., XEWW, VLA5, VLC 9, VLBIO, Saigon, Dakar 11700kc., XGOA 9730kc., PCJ 15220kc., XGOY 9650kc., Singapore 4820kc., 6770kc., 9690kc., 11735kc.

Mr. R. Clack: WLWR 9700kc.

Mr. J. Saunders: WLWR 16130kc., PCJ 15220kc.

Mr. T. Phillyson: VUD5/10, SEAC 15120kc., KWID, KNBA, PCJ, VLG10.

Mr. H. R. Cox: Singapore 1527kc, VLC6, VLG4, VLA8, VLH4/5, VLR/2, VLB10, VLQ3, HER4/5/6, HEU5, SEAC 9520kc, XEBR, WRUL.

Mr. R. O. Block HS8PD, Paris 15240kc., 15350kc., Johannesburg 9870kc., Jerusalem 7220 kc., OLR2A, Warsaw, VUD7, VUD10, VUD5 9590kc., VUD11 9670kc., XMAG, AFN 6080kc., CBLX, WRUW, WRUL, WNBI, WNRI, WNRX, XGOA, HER3, HER4, HEU5 HER5.

Master R. Rooke: VLA5, VLA6, VLC4, VLG3, VLH3.

Miss Sanderson: Rangoon.

**Our Own Listening Post.**—PRE9, 6105kc., 15165kc., SEAC 15230kc., Saigon 6165kc. (1st report from Australia), ZRJ 6097kc., XGOY 15170kc., XGOA 15350kc., OLR3A, HP5H, HOXA, KZOK 9690kc. (1st report from Australia), HCJB 15115kc. (1st report from Australia).

## NON-VERIFYING STATIONS

IN the following list we show stations which to the best of our knowledge do not verify listeners' reports, or perhaps more correctly have not been known to verify since before the war. It should be remembered that a station will somtimes verify one listener's report and ignore reports from others. This is quite often due to the quality of the report and the language in which it was written, as certain stations, especially some of the South Americans, will verify reports only if written in their own language. We always remember the reputation which HRN Tegucigalpa, Honduras, used to have as all American radio magazines blacklisted it as one of the worst non-verifying stations, and said they used to verify only about one in every hundred reports sent to them. Considering this, we were very diffident at writing to them when we did eventually manage to log the station, and imagine our surprise and satisfaction when back came their card in quite a short length of time. As compared to this, we cannot get a verie from Greece, despite having sent no fewer than seven letters, registered post, air-mail and what have you, while other listeners have got theirs with only one letter. And additions or corrections to this list will be appreciated. We are grateful to "Universalite" for the information given below. PRL7-8-9. Acknowledges letters but does not verify.

Radio Nacional de Espana. No QSL's since before the war.

USSR stations. No verifications since prewar.

LRR. Three years of trying, still no result.

HJCD. Same applies to this one, though one verie received.

HOB. No success yet, but we are still trying.

AFRS, USA. Acknowledge reports, but do not verify now.

## CRICKET FROM THE WEST INDIES

A FEW months ago readers will remember we reported reception of VRR5 in Jamaica giving a broadcast of one of the cricket matches between Jamaica and Barbadoes. These broadcasts were heard both from VRR5 on 12050kc. and also from ZQI on 4700kc. In their letter of verification, Cable and Wireless Ltd. asked us to look out for broadcasts of the forthcoming cricket matches between the MCC touring side and the West Indies.

Sure enough, just as we go to press with this month's notes we have heard a cricket commentary on a frequency of 15085kc. from before 7 am till about 7.15 am. The transmission sounded exactly like that heard from Kingston with a typically English voice describing the match. Unfortunately, the broadcast was very weak indeed and right alongside was a strong Morse station which very nearly blotted out the station giving the cricket commentary. We consulted all our station lists but could not find any West Indian station listed for 15085kc.

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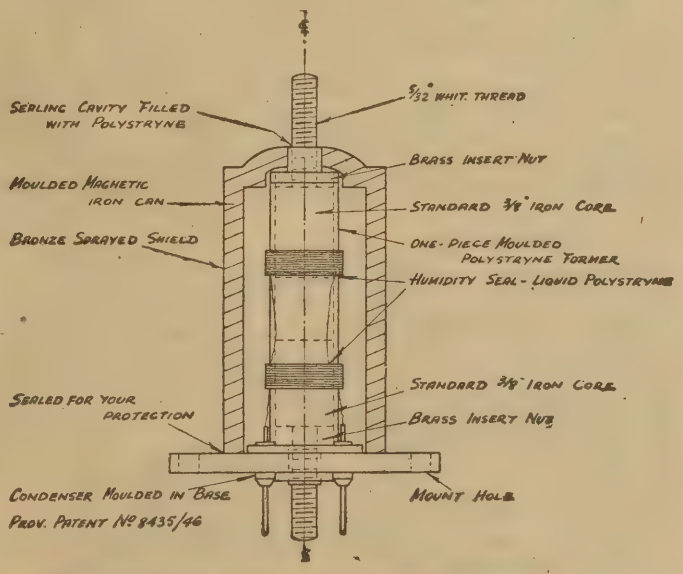


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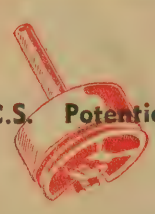

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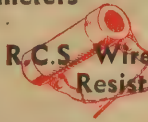

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# THE HAM BANDS WITH BILL MOORE

**The special committees on frequency allocations, sitting at the I.T.C. Atlantic City have completed their work and Amateurs throughout the world should learn very shortly of the Amateur bands available for their use.**

IT is quite apparent at this stage that band widths will vary quite considerably in various countries and some amateurs will even have the use of additional bands.

This will depend mainly on two factors—firstly, the Government's attitude towards amateur radio and secondly, on the demands of other services in any specific area.

The 7, 14, 21, and 28mc bands will be substantially the same throughout the world, but the low frequency and UHF bands, will be granted by the local authorities.

From the latest news it is anticipated, that the following frequencies will be available for the use of amateurs in Great Britain—1800 to 2000kc shared, 3500 to 3800 kc shared, 7000 to 7100kc, 7100 to 7150kc shared, 14,000 to 14,250kc, 14,250 to 14,350kc shared, 21,000 to 21450kc, 28,000 to 29,700kc, 144 to 146mc, 420 to 460mc, 1215 to 1300mc, 2300 to 2450mc, 5650 to 5850mc, 10,000 to 10,500mc.

The ARRL expects additional bands to the above will be granted, from 26,960 to 27,230kc, and from 50 to 54mc, besides extensions of other bands.

At the moment there is no definite knowledge of how we will fare in Australia. In the past we have received sympathetic treatment from the Department and more liberal frequency allocations than in Great Britain. We can hope the Department will again acknowledge the work of the Australian amateurs and afford them the greatest possible frequency range as permitted by international regulation.

## AMENDED REGULATION

IN a circular letter to all amateurs dated September 19, the PMG's Department announced two important changes in amateur regulations. These welcome changes were well received by Australian Hams.

The first change covers a change of status—all experimental stations will now be known as amateur stations and licensees as "Experimental Station Licensees."

This change follows accepted overseas practice.

The two classes of licence "A" and "B" have been eliminated and only one class of licence will be issued. A power limit of 100 watts input can now be used effectively doubling the power allowed "B" class licensees previously.

The Federal Executive of the W.I.A. is to be congratulated on the successful culmination of their efforts to obtain these changes. These matters were both agenda items tabled at the last Federal convention and councillors directed the F.E. to press for these changes.

The introduction of two classes of licenses postwar was a subject of much adverse comment, especially by ex-servicemen. The Wireless Branch is also to be congratulated on their rational interpretation of amateur problems and on this granting of additional privileges.

## 1947 DX Contest

SOME last-minute points that should be kept in mind before submitting logs, are as follow: Contestants are eligible for prizes in any, or all sections. A separate log however must be submitted for each section.

Other VK sections do not count as multipliers and that includes VK7 and VK9. ZL's will count as contest contacts.

Certificates will be issued to section winners and section winners in each State. Get your logs in as early as possible. The following is a complete list of prizes and the appropriate section.

CW Open—First prize, a pair of 800's and pair of 866A's. Second prize, 1 5BPI and AVII H.V. rectifier.

Phone Open—First, Dynamax microphone and desk stand. Second, Type TA907 modulation transformer.

28mc Phone—AR301 HF Receiver.

28mc CW—KS9'er.

14mc Phone—Eddystone components to the value of £5.

14mc CW—Transformer and chokes to the value of £5.

7mc—8in. Speaker, 2 6AC7's and subscription to QST or CQ.

Receiving Section—First Prize, 8in. Speaker, 2 6AC7's.

Subscription to CQ or QST. Second prize, 6AC7 and subscription to CQ or QST.

In addition to the above, a prize to the value of £3/3/- has been reserved for a 3.5mc award. If in the opinion of the judges, insufficient entries are received for any section, prizes can be re-allocated and transferred to other sections.

## FUTURE CONTESTS

INTERSTATE contests arranged by the Federal Executive of the W.I.A., for 1948, are as follows:

National Field Day—weekend of January 24, 25 and 26.

Trans-Tasman—weekend, May 15 and 16.

"Remembrance Day Contest"—weekend, August 14 and 15.

The first post-war European DX contest, will be arranged by the V.E.R.O.N., the Netherlands National Society. It was agreed that one contest would be run, instead of a number of smaller contests as in pre-war years. As the proposal was made by the Netherlands Society, they have the honor of sponsoring the first contest.

Full information and rules on the above contests will be published as soon as available.


# £100 for suggestions

**Just send in your suggestion of where and when to listen to the new Personal Portable radios made by all radio manufacturers. Eveready will pay £2 for every suggestion used. Address your entries to Eveready, Rosebery, Sydney.**

**£2** from Eveready to Mr. J. Ballantyne of 15 Robb Street, Essendon, Victoria who suggests taking a Personal Portable into the garden to take the drudgery out of weeding.

**£2** from Eveready to Mrs. Ada Colliens of Winston Street, Mittagong who suggests housewives take a Personal Portable from room to room. "Then you don't have to strain your ears listening to the living-room radio when you're out in the kitchen," says Mrs. Colliens.

**£2** from Eveready to Marie Edwards of 37 Bay View Ave., Earlwood, who says: "I'd take a Personal Portable with me on picnics with my boy-friend." There's nothing like music to aid romance.

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## AMATEUR DELEGATES TO I.A.R.U.

THE final list of IARU accredited amateur delegates to the International Telecommunications conference is to hand. Representing the ARRL—George W. Bailey, Kenneth B. Warner, A. L. Budlong; Canadian section, Alex Reid; Chinese Amateur Radio League, K. T. Chu; Liga Mexicana de Radio Experimentadores, Lt.-Commander J. H. Cerdan.

Norwegian Radio Relay League—Capt. Bjorn A. Rorholt (representing all Scandanavian Societies).

Radio Club Uruguayo—A. G. Balparda.

Radio Club Venezuelo—C. Nouel.

Radio Society of Great Britain—Stanley Lewer, John Clarricoats.

These amateurs have been in conference on many subjects pertaining to Ham work, including the dissemination of UN news. They have had the opportunity of discussing many subjects outside the scope of the I.T.C.

## Federal W.I.A. News

LAST month we made mention of the "Remembrance Day Contest" to be run in August, 1948. Amateurs are again requested to submit to the secretary of their division, the names of any amateurs who passed on during the 1939-45 war. The names of all "Silent Keys" are to be inscribed on the trophy.

It is the intention of the Federal Executive to publish shortly, a companion volume to the PMG Department's Handbook for AOPC holders.

The main headings in the Booklet will cover—Principles for the efficient operation of amateur stations, standards of station design and installation. Review of amateur activity generally and reasons why all amateurs should join the W.I.A.

Quite a lot of discussion at the last Federal convention centred on the subject of the division of bands for phone and CW. The Federal Executive was directed to write to the IARU and request a review of the possibility of divisions on an international basis. The IARU has replied. They stated they consider the suggestion impracticable, owing to the wide diversity of opinion on the use of phone and CW throughout the world. Another complication will arise, as it is probable that as a result of the ITC at Atlantic City, there may be a marked difference in over all band limits between various regions of the world.

## THE U.H.F.'s

KINDLY behavior of some sporadic E during late September allowed NSW stations to make some interesting interstate contacts. The band first opened on September 23 when 2BZ of Newcastle, 2ADT of Cessnock and 2OC of Wyong, broke through to South Australia. The 6MX band opened between 1830 and 1930 hrs. E.A.S.T. 2BZ contacting 5GF, 5RT and 5RV—2ADT to 5GF and 5RT and 2OC to 5RT. Signals were up to S9 at times. On Thursday 25, and Friday 26, South Australian stations were heard by both 2LY and 2LZ in the Blue Mountains, but contacts were not made.

Sydney to Newcastle contacts are quite commonplace now, since the change to horizontal polarisation antennae. 2NO, 2WJ, 2ZH, 2RA, 2MQ, 2AFO, 2LY and 2LZ are some of the stations working the Newcastle gang. 2JU's signals in Newcastle have been up to S8 at times.

2RA with an 813 in the final uses 4—8JK beams in phase, horizontal—2ZH using two 8JK's in phase.

Active in Queensland on 6MX are 4CU, 4AF, 4SN, 4LN, 4XD, 4PG and 4WI. 4CU, 4SN, and 4LN are using arrays, the latter using horizontal polarisation. Their big day is October 12 when the Queensland division of the W.I.A. has arranged a U.H.F. field day.

The September meeting of the NSW U.H.F. section was as usual well attended. Mr. E. Colyer, of A.W.A., lectured on valve curves. The U.H.F. field day was reviewed and it was decided at some future date to try and beat the 166mc record held by 2AHG and 2PW of 85 miles.


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## WEST AFRICAN DX

PERHAPS the hardest spot in the world to contact from the eastern States is West Africa. In a letter to 2YC, ZD4AB, on the Gold Coast gives an interesting insight into activity in the area.

ZD4AB himself operates daily on 28mc CW from 0630 until 0700 hours G.M.T. (a suitable time for VK contacts). If 28mc is dead, he changes to 14 mc. ZD2KC in Lagos, Nigeria, uses 28mc phone on 28,140kc—ZD4AH, Sekondi, Gold Coast, uses 28mc phone also, frequency 28,400. He incidentally, is an ex-VX Ham, ZD4AL, in Accra, uses phone on 28,300kc.

On 14mc CW are ZD3B in Bathurst, Gambia—ZD1WB, Freetown, Sierra Leone and ZD4AI and 4AM on the Gold Coast.

The above covers the activity of British colonial stations at present operating.

Liberian stations on 14mc are EL3A, 4A and 5B. FQ3AT, Fort Lamy, Chad Territory, is mainly on 14mc with VFO.

Another 28mc phone station is ZS6OL in Bechuanaland. The gang operate under quite a number of difficulties—plenty of QRN and mainly with DC supplies.

The Morse is sent at 18 W.P.M. and is repeated on voice on 3950 and 14,280kc. The information is firstly transmitted from UNO HQ at Lake Success, by W2BSP to WIAW.

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GOOD BOY!
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# OFF THE RECORD — NEWS & REVIEWS

## Once more the recording companies score heavily with some excellent releases, particularly the London Philharmonic Orchestra's new performance of "Petrouchka." It is even better than the Stokowski version, generally considered to be the previous best.

By JOHN MOYLE

LONDON PHILHARMONIC ORCHESTRA, Cond. by Ernest Ansermet, Solo Pianist — Ernest Christensen—"Petrouchka — Ballet Suite" (Stravinsky). DECCA Z.877/81.

Many consider Petrouchka to be the finest of all ballets. They have plenty to support their argument. In the first place it is ballet all through—music and choreography were created together — it is not music adapted for dancing.

More than this—it is not merely dancing to music. You must know what Petrouchka is about before it means anything to you. So if you don't know the ballet, go and read about it. Better still, buy that Penguin edition of "Bullet in the Ballet."

The story is of the doll dancer Petrouchka who is so lifelike as to be almost human, but not quite. To his half-formed soul, his dancing doll companion becomes idealised and passionately adored. Her love affair with the primitive, uncouth Moor, the third doll, starts a tale of jealousy and violence, in which Petrouchka is killed by the Moor. But the crowd isn't so sure that he is "only a doll." Even the magician, hastily summoned, scarcely convinces them. And when the crowd is gone, the snow falling, and the ghost of Petrouchka appears behind the dancing booth, he cowers away in terror.

The ballet is full of symbolism, and requires artists of the highest order to do justice to it.

The music is probably Stravinsky at his prodigal best. Incredible orchestral effects are obtained, particularly in the musical atmosphere of the village fair scenes, in which all the sounds and events are meticulously and wonderfully created in lavish, brilliant colors. Every note has its significance, from the heart-breaking, despairing Petrouchka theme, to the little twitching flirts as his body jerks convulsively on the ground in the closing scenes. In many ways it has a parallel in "Pagliacci," but with great subtlety to replace the opera's unrestrained outpourings.

There is far more on the records than the average gramophone will reproduce. Its frequency range is far greater than the Stokowski recording, particularly in passages such as the first fair scene. You will hear, for instance, a xylophone near the end of this scene which in the earlier records is scarcely discernible.

Stokowski, also, is much much more obvious in his treatment. This recording is remarkable for the splendid ballet sense it conveys. The orchestra has rarely been heard to such advantage—it would be difficult to select any passage which could be considered inadequate or unresponsive.

The pressing on the whole is good, although the extreme dynamic range finds it out in a few spots. They are but few, and it would be very hard for any small blemishes to spoil a recording of this calibre.

THE CONCERTGEBOUW ORCHESTRA OF AMSTERDAM, Conducted by Edouard van Beinum — "Leonora Overture No. 2" (Beethoven). DECCA Z.841/2.

An exceptionally fine performance—there's no doubt about it. Considered as Beethoven, it equals the work of any of the recognised Beethoven specialists and has plenty to spare.

Leonora, the last of three attempts, is really a die-hard of the concert platform. But like so many Beethoven die-hards, it has fine music and orchestration throughout.

The conductor has really achieved something in his treatment of the early section, with its foreboding of tragedy, followed by the wild passages of conflict, terminating in the rescuing trumpet call off-stage.

The orchestra, too, shows scarcely a fault from beginning to end. The recording is full and vital with plenty of frequencies. In one or two spots, it might present a doubtful moment to all but the best pickup. But it is easily one of the finest Leonora's I have heard.

EILEEN JOYCE, Pianist, with Halle Orchestra conducted by Leslie Heward—"Concerto in E Flat Major for Piano and Orch." (Ireland). COLUMBIA DOX.857/9.

Eileen Joyce plays this type of thing exceptionally well. Frankly, I find many passages so abstruse as to be rather redundant, not to say unnecessary. But it has the signature of John Ireland all over it, and many people go for it in a big way. They will not be disappointed. There is very little to it, apart from the creation of mood and atmosphere. It is splendidly recorded right through, clearly played, with good instrumental definition. Here and there it is undeniably beautiful. More than that I'll not say, until I have played it more often.

EZIA PINZA, Bass, with Metropolitan Opera Orch. cond. by Bruno Walter—"Don Giovanni—Madamina" (Leporello's Catalogue Aria) (Mozart) (In Italian). COLUMBIA LOX.615.

The greatness of Mozart must strike even the casual listener who hears operatic arias such as this. They are inimitable, ever fresh, and magnificent.

The recording is vivid and clean as a whistle. Pinza's fine voice handles the music with ease, against a splendidly balanced background, unusually clear and sweet. It is not a brilliant recording, but it is a mighty good one. If your gramophone is good, you'll appreciate the quality of the violins. They are the real thing.

NBC SYMPHONY ORCHESTRA Conducted by Arturo Toscanini—"The Thieving Magpie" —Overture (Rossini). HMV ED.516.

An example of the Toscanini precision and the hard, brittle recording so beloved of the Americans. It has keen definition, and well recorded high frequencies, but the net impression is just a little rowdy. The music is well known, and acceptable to any kind of ear.

JOAN HAMMOND, Soprano, with Philharmonic Orchestra cond. by Vilem Tausky. "Softly Sighs"—Recit. and Aria (Argatha's Aria) (From "Der Freischutz") (Weber). HMV EB.387.

Former remarks about Joan Hammond still apply. She just isn't big enough to do full justice to these roles. But she does the best she can, and thousands like it that way.

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# Other Releases This Month

**COLUMBIA**

FRANK SINATRA WITH THE KEN LANE SINGERS AND ORCHESTRA.—"Jingle Bells" and "Ain'tcha Ever Comin' Back?" DO.3055.

MIKLOS GAFNI (tenor) with Orchestra. —"HUNGARIAN MEDLEY" (A) Fa Leszek (B) Nagy A Feje (C) Minek A Szoke" and "A Ven Cigany (The Old Gipsy). DO.3056.

MIKLOS GAFNI (tenor) with Orchestra.— "Chak Egy Kislany" (The Only Girl) and "Keso Osz Van" (Late Autumn). DO.3057.

FRANKIE CARLE AND HIS ORCHESTRA. —"The Man Who Paints the Rainbow in the Sky" and "Double or Nothin'." DO.3058.

VICTOR SILVESTER AND HIS BALL-ROOM ORCHESTRA.—"How Do I Know" and "My Love For You." DO.3059.

DINAH SHORE WITH ORCHESTRA.— "Dixie" and "Who'll Buy My Violets." DO.3060.

HARRY JAMES AND HIS ORCHESTRA.— "Heartaches" and "Meet Me at No Special Place" (And I'll be there at no particular time). DO.3054.

LILY PONS (soprano) acc. by Columbia Opera Orchestra.—"Pourquoi Dans Les Grands Bois" (Why, In the Big Forest) "Bell Song" (From "Lakme") (Delibes) Parts 1 and 2. DO.80.

VICTOR SILVESTER'S STRINGS FOR DANCING.—"Springtime Flowers" and "Zephyrs of Springtime." DO3036.

MAREK WEBER AND HIS ORCHESTRA.— "Fledermaus Selections" (Strauss). DO.3037.

NELSON EDDY (baritone) with Orchestra. —"Danny Boy" (Trad.) and "I Love You" (Grieg). DO.3038.

**PARLOPHONE**

THE ORGAN, THE DANCE BAND AND ME. —"If You Were the Only Girl In the World" and "Among My Souvenirs." A7623.

WILL BRADLEY AND HIS ORCHESTRA FEATURING RAY McKINLEY.—"When You and I Were Young, Maggie" and "From the Land of the Sky-Blue Water," Mendelsohn. Clark, Hucko, Hayes (Saxes); Bradley, Emert, Corti (Tmbs.); Lipkins, Castaldo, Fila (Tpts.); Holt (Pno.); Goldberg (Bass); Jordan (Gtr.); McKinley (Dms.). A7624.

RICHARD TAUBER (tenor) with Orchestra. —"The Blue Danube" and "Tales from the Vienna Woods." AR396.

LOUIS ARMSTRONG AND HIS HOT SEVEN. Hot Jazz Classic No. 26.—"Struttin' with Some Barbecue" with Louis Armstrong (Tpt.); Johnny Dodds (Clt.); Kid Ory (Tmb.); Lilian Armstrong (Pno.); Johnny St. Cyr (Bjo.); Baby Dodds (Dms.); Pete Briggs (Tuba). Recorded 24/1/1928, and "The Lonesome Road" with Louis Armstrong, Z. Randolph (Tpts.); P. Jackson (Tmb.); L. Boone, G. James, A. Washington (Reeds); C. Alexander (Pno.); M. McKendrick (Bjo); J. Lindsay (Bass); T. Hall (Dms); Vocal chorus by Louis Armstrong. Recorded February, 1932. A.7625.

**H.M.V.**

VAUGHN MONROE AND HIS ORCHESTRA. —"I Wish I Didn't Love You So" and "The Pleasure's All Mine." EA.3564.

SAMMY KAYE AND HIS ORCHESTRA.— "Touch-Me-Not" and "I Can't Believe It Was All Make-Believe (Last Night)". EA.3565.

PHIL HARRIS AND HIS ORCHESTRA.— "(I've Been So Wrong for So Long—But) I'M So Right To-night" and "Where Does It Get You In the End?" EA3566.

BENNY GOODMAN QUARTET.—"Dizzy Spells" and "Sweet Lorraine." EA3567.

CHARLIE SPIVAK AND HIS ORCHESTRA. —"You Can Take My Word for It, Baby!" and "(There is) No Greater Love." EA.3560.

THE SKYROCKETS ORCHESTRA.—"The Rickerty Rickshaw Man" and "Accordian." EA.3561.

PERRY COMO WITH ORCHESTRA.— "Sonata" and "That's Where I Came in." EA.3562.

GLENN MILLER AND HIS ORCHESTRA.— "Yours Is My Heart Alone" and "My Isle of Golden Dreams." EA.3568.

WAYNE KING AND HIS ORCHESTRA.— "Je Vous Aime" and "What'll I Do." EA.3569.

JAMES MELTON (tenor) with Orchestra.— "Our Waltz" and "Holiday for Strings." EA.3570.

DUKE ELLINGTON AND HIS ORCHESTRA. —"Five O'clock Drag," Duke Ellington (Pno.); J. Hodges, O. Hardwick, B. Webster, H. Carney (Saxes); B. Bigard (Clt.); R. Stewart, W. Jones, R. Nance (Tpts.); J. Nanton, J. Tizol, L. Brown (Tmbs.); F. Guy (Gtr.); J. Blanton (Bass); S. Greer (Dms.) and "Harlem Air Shaft," Duke Ellington (Pno.); B. Bigard, J. Hodges, O. Hardwick, B. Webster, H. Carney (Saxes); C. Williams, W. Jones, R. Stewart (Tpts.); L. Brown, J. Nanton, J. Tizol (Tmbs.); F. Guy (Gtr.); J. Blanton (Bass); S. Greer (Dms.). EA.3563.

POVLA FRIJSH (soprano) with Celius Dougherty at the piano.—"Le Paon (The Peacock) (Ravel) and (a) Automne (Faure); (b) Voici Que Le Printemps (Spring is Here) (Debussy) (In French). ED.517.

MARIAN ANDERSON (contralto) with Victor Symphony Orchestra.—"My Old Kentucky Home" and "Carry Me Back to Old Virginny." EA.518.

JOSE ITURBI (pianist).—"Dance of Terror" and "Ritual Fire Dance." EC.163.

CHARLES SHADWELL AND HIS ORCHESTRA.—"Perchance to Dream" intro: When Gentlemen Get Together; A Woman's Heart; Highwayman Love; We'll Gather Lilacs; Highwayman Love; The Meeting; Curtsy to the King; Love Is My Reason (Novello). EB.386.

BBC CHORUS (Unaccompanied) Cond. by Leslie Woodgate.—"Where Does the Uttered Music Go?" EB388.

DICK LEIBERT, Organ, with Edward Vito, Harp.—"Estrellita" and "A Kiss in the Dark." EA3543.

ALLAN JONES (tenor) with Victor Concert Orchestra.—"Why Do I Love You?" and "Make Believe." EA.3544.

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STEVE CONWAY WITH ORCHESTRA.— "May I Call You Sweetheart" and "Show Me the Way." G.25147.

LOU CAMPARA AND HIS SERENADERS.— "Sunrise in Fairyland" and "(Go to Sleep) My Darling Curley Head." G.25148.

GENE AUTRY.—"Home on the Range" and "Ridin' Down the Canyon." G.25149.

ELTON BRITT (Singing with Guitar, Violin and Accordian).—"There's So Much that I Forgot" and "I'll Die Before I Tell You." G.25150.


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# SERVICEMAN WHO TELLS

**(Continued from Page 59)**

However, on replacing the chassis in the cabinet, I found that the set was not nearly as silent as it had apparently been just a few moments before. Matters were improved, but not to the point where the owner was really satisfied. Loosening the chassis bolts and lifting the chassis slightly had the effect of reducing the hum to negligible proportions. In other words, it was a clear case of mechanical rather than electrical trouble.

## HUM CAUSES

Why this happens in some cases, I don't know. I think it is just a random concurrence of a power transformer with slightly loose windings or laminations and a cabinet with a mechanical period of about 50 c/s. In this case, I found that a full turn could be given to each of the screws holding down the power transformer laminations. When replacing the chassis, I slipped a strip of felt under each edge to keep it off the bare wood and also put a felt washer under the head of each of the locking bolts. This treatment made just the difference between a hum which could or could not be tolerated by the owners.

In an extreme case it may be necessary to pack the transformer windings with cardboard strips if it happens to be loose on the centre leg of the core. A chassis with a slight warp in it can aggravate the trouble, or a too-light shelf which itself acts as a baffle. Felt packing or a stout brace is the cure in such an extreme case.

The trouble can occasionally come from filter chokes, particularly in the case of amplifiers using a choke input type filter. With a large ripple voltage across the winding, a choke has to be very well clamped if it is not to hum even more loudly than the power transformer itself. In the case of a condenser input filter the problem is simpler, since the first condenser minimises the amount of ripple appearing across the choke.

## ROOM EFFECTS

One other point I may mention in passing, namely, the importance of allowing for the effect of room noise when assessing the hum level. The usual suburban living-room is very quiet and one can often hear the faintest trace of hum, whether it be mechanical or electrical in origin.

On the other hand, this same amount of hum may not even be audible in a factory or workshop with a much higher minimum noise level. As often as not, when there is occasion to assess hum level under very noisy conditions, I rely as much as anything on feeling the cone with the tips of the fingers. It is surprising how sensitive the fingers are to slight vibrations.


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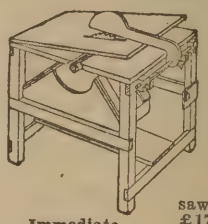

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# ANSWERS TO CORRESPONDENTS

**J.E. (Murrumburrah, NSW)** says he finished the "Tiny Two" receiver, but has not had particularly good results with it. He now proposes to go ahead with the construction of the "Little General."

A. We have no information whatever about reception conditions in your area, but it is possible that you are expecting too much of this little set. However, with a good aerial and earth it should perform quite well at night-time if operating correctly. We trust you understand the need for having an accurately matched aerial and R.F. coil with reaction, and have adjustable trimmers across each section of the gang to ensure optimum performance. Although the "Little General" is a more ambitious type of set, it is not an ideal choice for use in country areas, and we would suggest that you spend the extra amount and build at least a five-valve receiver, viz., the "1947 Advance." Thanks for your suggestion regarding articles for beginners and for your observations on model aeroplane activities.

**A. H. G. McI. (Brisbane, Qld.)** sends in his subscription to "Radio and Hobbies" and asks a number of questions.

A. The maximum permissible grid circuit resistance of the EL3-NG should be about 0.5 megohm using cathode bias. There is quite a lot to the subject of negative feed back as applied between the secondary of the output transformer and some point early in the amplifier. Apart from the mere calculation of gain reduction one has to make certain that phase shift at either end of the audio spectrum will not cause instability. Provision of separate and effective base and effective base and treble controls normally entails the use of an additional stage, since boost at any point in the spectrum infers that the audio system has a large reserve of gain which is not normally used for level reproduction.

**W. McS. (Auburn, NSW)** writes to comment on a variety of subjects.

A. The publication date of "Radio and Hobbies" has varied for production reasons but we are planning to release it as far as possible in future on the first Friday in each month. Advertisements in "Radio and Hobbies" normally quote retail prices but it is purely a matter for advertisers' policy as to whether he quotes prices at all or gives such details as freight costs and distribution arrangements. We note your remarks about radio advertising and serials, but the very fact that these are run for long periods of time indicates that they still hold some listener interest. As to the manner and frequency of advertising "plugs" it is once again a matter for the advertiser to decide how frequently he can afford to mention his product without detracting too much from the entertainment value of the programme.

**T.C.C. (Sth. Brisbane, Qld.)** suggests that we do not give as much attention to beginners as he would like and also sends in a circuit for comment.

A. Actually we are planning to run a series of articles for beginners and this should be of considerable interest to you. Your circuit would probably operate as it stands but we suggest that you operate the screens of the first two valves from a tapping on a voltage divider, which will help to stabilise both the screen voltage and the high tension voltage. You will almost certainly have to use a 6U7-G as the first R.F. amplifier to prevent distortion and cross modulation effects. Run the screen resistor for the detector to the plate decoupling network and also decouple the grid circuit of the 6F6-G to prevent hum troubles. You actually show the 6F6-G bias joined to the B-plus line but we take it that this is a slip in drawing.

**R.C.H. (Lucknow, Vic.)** writes in appreciation of "Radio and Hobbies" and says he has built up a two-valve receiver using a 30 and 1D4.

A. Many thanks for your letter and we are glad to note that the receiver is performing so well. Regarding the short-wave coil it is possible that you have the reaction winding connected the wrong way around in the circuit, so that reversing the leads may give the desired result.

**J.S. (Marrickville, NSW)** has built the "Tiny Tim II" receiver but says that reception is marred at times by crackling noises and actual howling.

A. In the first place it is bad practice to have the aerial loose on the roof. It should be slung between insulators and kept clear of all objects. This may have something to do with the crackling, although it could equally well be due to a fault in the receiver itself. In regard to the howling, make sure that the leads to the volume control are shielded and keep the output plate leads away from the input circuits. A bypass of .005 mfd. between the output plate and earth or B-plus may also have the desired stabilising effect.

**T.P.G. McK.** asks whether the power mains can be connected to the aerial coil through a mica condenser with the idea of eliminating the external aerial.

A. The idea does work but is not one we particularly like. In many cases the signal pick-up is poor and there is increased chance of electrical interference. The coupling condenser must be of good quality to avoid risk of breakdown and shock when touching the chassis. Sorry, but we cannot undertake winding calculations for transformers or field coils, since it involves more time than we can spare over an individual query.

**R.D.** asks a question about the tuning of a tritet oscillator.

A. A check on crystal current would probably reveal that it increases abruptly towards the point where oscillation ceases. Judging by your statement, one can only assume that you have too many turns on the cathode coil, making it necessary to have a very small amount of capacitance.

**J.W.D. (Parramatta, NSW)** writes in appreciation of "Radio and Hobbies" and in particular the remarks recently made on F.M. and its effect upon radio trade.

A. We have attended to your subscription and thank you for your encouraging remarks. It is unfortunate that the public appears to have gained the wrong impression about F.M. and, as you say a long time will elapse before present A.M. arrangements are superseded—if ever.

**A.G.L. (Elimbah, Qld.)** sends in an advertisement and says he built up the vibrator amplifier described in September, 1946, but finds that he has difficulty in reducing the volume sufficiently.

A. Thanks for the advertisement and we are pleased to note that you have had such success with "Tom Thumb." Regarding your amplifier it would seem that you are feeding the pick-up straight into the input terminals without a volume control. If a volume control is installed and is operating correctly you should be able to vary the output from maximum down to a mere whisper. We will be pleased to assist you if you write in through our one shilling query service and enclose a copy of the amplifier circuit as you now have it.

**L. G. McK. (Dennington, Vic.)** wants to use the EF50 as an R.F. amplifier and asks about the circuit constants.

A. We have used this valve as an R.F. amplifier in quite an ordinary circuit arrangement. The screen is returned to B-plus 250 while, for most purposes the valve can be used with a conventional A.V.C. circuit. The cathode resistor could be about 300 ohms although it is wise to experiment with this value to obtain the best balance between gain and stability. Glad to note that you have derived so much help and pleasure from "Radio and Hobbies."


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# ANSWERS TO CORRESPONDENTS

**B.A. (Ivanhoe, Vic.)** wants to build an amplifier for pickup and microphone operation and asks about the most suitable circuit.

A. The circuit most likely to meet your requirements is the PA-6 amplifier, which you apparently know about already. Any amplifiers in earlier issues lacked the necessary pre-amplifier and mixing system. If you require higher power than is available from the PA-6, we suggest that you simply use the pre-amplifier stage and mixing system of that circuit ahead of the 807 amplifier circuit in this issue. It should make up into an excellent job for public address work.

**C.R.M. (Gympie, Qld.)** sends in a superhet circuit for comment. He has built it up very carefully but gets nothing from it but a continuous oscillation.

A. We are afraid you will have to begin again, as you will never get results from the circuit in anything like its present form. Triode amplifiers in the RF and IF stages will oscillate independently due to grid-plate capacitance, let alone with the added effect of performing both functions in a twin triode valve. Pentodes or nothing is the motto for this set. Use of a 19 as diode detector and triode audio amplifier is OK, of course, but detailed comment is unwarranted in view of the unsatisfactory nature of the rest of the circuit.

**J.F. (Murwillumbah, NSW)** asks whether a loop aerial can be used with the "Tom Thumb" receiver similar to that employed for "Tex."

A.: We see no reason why a loop should not be used, although the diameter is smaller and more turns would be required. The exact number of turns would have to be determined by experiment, but you would not go far wrong if you wound on the same length of wire as was necessary for the larger set.

**N.H. (Emu Flat, Vic.)** asks us about an American station which carries a special programme on the broadcast band.

A.: We do not try to keep track of stations and programmes ourselves but have passed your letter on to Mr. Ray Simpson, who may just possibly be able to assist you. If not, we suggest that you try to get in touch with our former broadcast band DX correspondent, Mr. Roy Hallett, at 36 Baker-street, Enfield, NSW.

**C.T. (Carlton, Vic.)** is interested in amateur and short-wave affairs and says he would like to see "Radio and Hobbies" describe an ambitious short-wave receiver having wide frequency coverage and provision for band spread tuning.

A.: Many thanks for your letter and for the encouraging remarks you have to say about "Radio and Hobbies." As you say, the design and construction of such a set becomes very involved and the performance of many commercial receivers of this nature depends a great deal on mechanical features which cannot easily be duplicated by the home-builder. The nearest approach we have made to this type of set was the "Communications Nine," which incorporated complete coverage and band spread over the higher frequencies from 30 to 3 megacycles. Regarding your suggestion about test voltages, we may consider the matter further as we have had other requests of a similar nature in recent weeks.

**R.V.M. (Molong, NSW)** is a young but enthusiastic reader who sends along his ideas about model aeroplane features.

A.: Thanks for your letter, R.V.M., and for your suggestions regarding model flying articles. The ideas are quite good but our problem is to obtain sufficient space to make possible any extensive programme along this line. However, your ideas will be borne in mind. We are glad to note that the 1Q5-one has proved so successful and we trust that you will have equal success with the "Tom Thumb" receiver.

**J.V.H. (Rainbow, Vic.)** sends in his subscription and suggests that we should give more attention to AC/DC and DC mains receivers.

A.: Thanks for your subscription, which has duly been attended to. We agree that we do not give much attention to AC/DC or to DC mains receivers, firstly because the actual percentage of readers interested is small and continuously diminishing and secondly because of the danger element associated with such sets.

**B.J.G. (Red Hill, Qld.)** is keen to build a wire recorder and also asks about B.F.O. coils.

A.: Two or three years ago we carried out some preliminary experiments with the idea of making up a wire recorder but found it impossible to obtain supplies of the correct wire. The wire used is very fine gauge steel of good magnetic properties, whereas all we could obtain in Australia was fine piano wire which was still much too heavy for the job. It appears to be unsuitable electrically and presents an almost impossible handling task. In the light of this experience we dropped the matter for the time being and are not in a position to supply constructional details of such equipment. As far as we know, the wire is still unprocurable for experimental work. Regarding B.F.O. coils, one can use an ordinary IF transformer, preferably with the feed back winding disconnected from its tuning condenser. A small variable condenser is then wired across the other winding and the coil adjusted by its normal trimmer or slug to oscillate at the intermediate frequency with the variable condenser set to about half its range. If the circuit refuses to oscillate at first trial, reverse the connections to the untuned feed back winding. In the event of an iron-cored transformer being used, the slug should not be removed as it would obviously upset the alignment of the tuned circuit.

**H.McD. (Shackleton, WA)** reports having built up the 1Q5GT one valve receiver which gives him good reception of the two nearest stations, each 50 miles away.

A. We are pleased to note your satisfaction with "Radio & Hobbies" and the pleasure you derive from experimenting with small sets. It should make a very big difference to the performance of your set to use it with either 2000 or 4000 ohm phones, in place of the 100 ohm phones you now have. Regarding the high tension voltage, it would be quite in order to operate it from either two or three 9-volt "C" batteries, although there is no point in increasing the voltage beyond that which is necessary to give you the desired reception. The increased voltage is not likely to harm the valve, but the drain on the batteries is higher, so that operating costs multiply.

We are quite at a loss to explain why the extra resistor should so increase the volume of the set, but can only assume that it is having some secondary effect in your particular receiver. In the normal way, the connection of a resistor in this position would be expected to ruin the reception altogether.

**R.J.C. (Perth, WA)** suggests that we could include a page regularly in "Radio & Hobbies" setting out the base connections of the popular valve types.

A. Many thanks for your letter, R.J.C., but we cannot possibly spare the space to follow your suggestion. One simply cannot add an odd page to the issue, as the number of pages is fixed by the manner in which the paper is folded in printing. In any case, valve manufacturers go to a lot of trouble to make available socket diagrams and characteristic charts for their products.

**R.S. (Penrith, NSW)** is keen to build up an electric guitar and asks us for the necessary plans.

A. We have published two or three articles on the general subject of electric guitars but are unable to supply now any of the back issues or the relevant diagrams. However, there is quite a lot to it and we doubt whether you can look for success by using a single telephone earpiece.

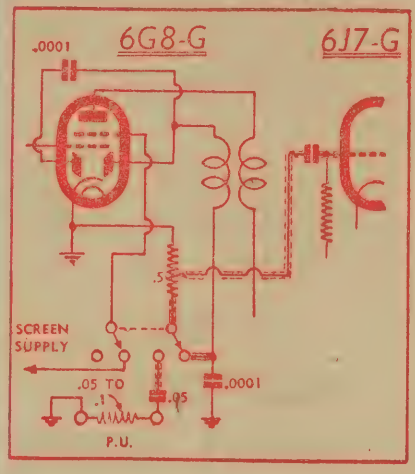
**E.T. (Toowoomba, Qld.)** has what is apparently some thermo-couples on hand and wants to know whether they can be used as rectifiers in an A.C. multimeter.

A. The thermo-couple devices you have are intended to operate with a maximum current of either 0.3 or 0.8 ampere. They have a square law characteristic which renders them very insensitive for low values of current. Although we have never had occasion to try out the scheme in practice, you would probably find that the rectification efficiency would be small at the extremely low current drains involved in a multimeter. There are occasional hold-ups in the distribution of ex-disposals valves but it is fairly safe to assume that distributors have stocks of all types they feature in advertisements.

# P.U. CONNECTIONS FOR "ADVANCE"

**Since describing the "Advance" in the September issue, we have received many letters from readers enquiring about the use of a pickup with this set. The modifications necessary are worth discussion since they apply in general to receivers other than the "Advance."**

IN the majority of modern receivers, it is necessary to instal some form of switching so that the audio end of the set can take its signal either from the pickup or from the detector circuit. In most cases it is unsatisfactory to have the pickup permanently in circuit, even though external terminals may be provided for its connection.




The correct procedure is to locate the "hot" end of the volume control, which will normally connect through to the diode detector circuit. Putting your finger on this lug with the gain turned up will usually cause a loud hum or squeal to be heard in the speaker.

Disconnect all leads from the particlar lug on the control, and run a shielded lead from the lug to one section of a double-pole, two-way switch, which can be mounted as desired on the front panel or at the rear of the chassis.

A second shielded lead is then run from the switch back to the wires which you have previously disconnected from the potentiometer. From this same section of the switch, a third shielded lead will run to a coupling condenser and thence to an insulated terminal for connection to the pickup. The other pickup terminal is simply earthed to the chassis.

Referring to the circuit, the switching serves simply to transfer the live end of the volume control from detector circuit to pickup, or vice versa. The same instructions and procedure apply, irrespective of whether the volume control serves as the diode load or not. The series condenser prevents any possible bias voltage from appearing across the pickup.

Where a magnetic pickup is used, it is often helpful to clip a resistor of from .05 to .0.1 megohm across the terminals to provide better load conditions and improve the tonal balance.

The second pole of the switch should be wired in the screen circuit of the I.F. amplifier valve to remove the screen voltage with the switch in the pickup position. This measure prevents the radio signals being heard as background to recorded items.

# HINTS ON HOME RECORDING

(Continued from Page 67

effects of adversely loading the diode circuit or having too much capacitance in the connecting lead. Even allowing for these facts, however, the distortion level is likely to be very much lower than at later points in the receiver circuits, particularly in the output circuit of the power valve

Provided care is taken, some really excellent recordings can be made of items arriving via a radio receiver One point of note is that the best recordings are made with a receiver having only moderate selectivity. High selectivity means severe sideband cutting and a treble loss, sufficient to render the recording dull. If too much treble boost is used to restore this loss, high harmonic distortion is likely to be apparent.

For direct microphone work, a ribbon microphone is a good choice, provided it is only used under favorable acoustic conditions, and set well back from the performer.

Dynamic or crystal microphones allow for closer working and can therefore be used under conditions where echo would otherwise be troublesome. However they have more apparent resonance affects which militate against a smooth reproduction of music. Be careful, therefore, to select a microphone which is likely to be suitable for general work rather than one which has been designed primarily for voice work.

## FIRST DISCS

When you actually come to making a disc, you can resign yourself to having a couple of spoils, anyway. Therefore, rather than go right ahead and cut a whole side at once, proceed step by step and make a series of small test cuts which will show you clearly the possibilities and limitations of the equipment.

Make the first cut with the amplifier switched off altogether. Adjust the weight and cutting angle so that the thread comes away cleanly and the width of the groove looks about equal to or a little narrower than the width of the "land" between grooves. Then "play" the disc with a light pickup, having first set the gain of the amplifier to the normal listening level for commercial recordings.

Under these conditions, no more than a gentle hiss should be noticed. If the hissing noise is excessive and harsh, it may indicate either a blunted stylus or a wrong cutting angle causing the stylus to tear the material. Any suggestion of aluminium showing through the coating would indicate too deep a cut, while too shallow a cut may not allow the pickup to track properly. It is worth mentioning, in passing, that the pickup must be well balanced, mounted for correct tracking, and perfectly free to move vertically or horizontally.

The weight should be as low as possible, with plenty of compliance in the needle. Nothing more heavy than a good crystal pickup should be tolerated. The majority of cheap magnetics will very quickly ruin a playback disc.

If there is evidence of hum on the groove, it demonstrates that vibration from the motor or turntable is affecting the cut and steps will have to be taken to eliminate this source of trouble.

Make the next cut—just half an inch or so—with the amplifier switched on and again check for noise and hum on the groove.

If this is satisfactory, turn up the gain, and speak into the microphone with your finger on the tip of the recording stylus. You should be able to feel the vibrations quite distinctly as you speak.

## THIRD CUT

The third cut can now be made, using the microphone and watching the setting of the volume control and level indicator. It is most satisfactory to speak naturally into the microphone, stating simply the setting of the controls, distance from microphone and the level of your voice. Begin with the volume, well down and advance it in steps, stating each time the setting of the control and indication of the volume level meter.

The disc can then be played back and some idea formed of the optimum setting of the gain control. Another cut can then be made to check the settings of the tone controls, and the position gauged for the most natural voice quality. Remember that more treble boost will be required at the inside of a disc than at the outside.

Having made a couple of successful voice recordings, turn your attention to music and see whether sustained piano or organ notes are free from turntable "wow." After that it is simply a matter of learning microphone and room techniques and doing your best to circumvent any limitations which may be evident in your equipment.

# *ANSWERS TO CORRESPONDENTS*

**W.J.G. (Pooraka, SA)** writes to congratulate us on the interesting nature of "Radio and Hobbies" and says he is keen to own a battery-operated communications type receiver.

A.: Many thanks for your letter and we note your interest in a battery-operated set. Such a set could follow the general lines of any one of the AC receivers, but problems are likely to arise since the battery tubes have no cathodes available for gain control purposes. Another point is that the battery type converters are rather poor at high frequencies and some special arrangement may have to be made for the frequency changer valve. Regarding the one-valve set using the 6V6, it is a definite mistake to use any bias with this valve as a regenerative detector. The valve must operate with zero bias, the plate and screen voltage being reduced to limit sufficiently the current flowing. It is hard to say just what is wrong with the AC/DC Checka-meter. Failure of the ohms scale indicates quite clearly either a mistake in the wiring or a faulty component which is preventing the meter from reading in this position.

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FOR SALE: Radio Parts and Mantel Cabinets, will sell cheap, apply **R. J. Hing, Tenterfield, N.S.W.**

SALE: Valves in new condition—(few each) —6F6, 6H6, 6F7, 6J7, 6AC7, 5V4, 12J5, 12A6, 12K8, 807, 809, 866A, 1625—all half cat. price. **—W. A. Packer, 48 Berry St., East Melb.**

FOR SALE: Rola G-13 excellent condition, £6. **C. Llewelyn, 2 Stanley Ave., Mosman.**

SALE: No. 3 Meccano set, good condition, equipped with strong clockwork motor. **A. R. Vinicombe, 20 Codrington St., Sale, Vic.**

SALE: Amplifier and 12" speaker, 1 pick-up, also 50 modern recordings. £25. **Mr. D. Price, 39 Bligh St., Muswellbrook.**

FOR SALE: 1 three valve receiver, 4 switch bands, SW & B. Complete with new set headphones. Will work speaker. Less batteries, £8. Also Amplifier Chassis, wired p.p. needs 3.30 and 1 32 valves. Good output on 135v. £2. **W. E. Woodrow, Box 69, Millmerran, Queensland.**

SALE: Console wireless. Four valve Autodyne Superhet. Complete in pol. wood cab. Working order. Only £4. Ring **Haw. 7123.**

FOR SALE: 3in, 5in, and two 12in C. R. tubes, new, £1 ea, also 807 and 813 valves. **Gudgeon, UW8561, Parramatta.**

FOR SALE: University MVA Multimeter, perfect condition, hardly used. Complete with carrying case. £8 or near offer. **G. G. Bentley, 44 Browning St., Moonee Ponds, Vic. FU5246.**

FOR SALE: Army wavemeter, 1470-10260 kc/s. Good condition, £4/10/-, or best offer. Also No. 11 transciever power supply, £1; 30 feet 70 ohm Coaxial cable, 15/-; remote control unit, 25/-; new RF 0-1 ammeter, 15/-; carbon hand microphone, 5/-. Other radio parts cheap. Write or call, **15 Dalleys Rd., Naremburn. Phone XA2382.**

SALE: American A.T.R. Inverter. Input 12 volts. Output 220 volts AC at 100 watts. Perfect cond., had little use. Ideal for amplifier, etc. Price £10/10/-. **L. G. McPherson, 14 Drummond-st., Sth. Ballarat, Vic.**

FOR SALE: Kits of parts for "R. & H." receivers. Little Ten: £13/12/6; Tom Thumb: £8/10/-; Springtime Portable: £16/7/6. Postage inclusive. **R. O'Neil, 87 Eglinton-st., Moonee Ponds, Melb. Vic.**

SALE: Radio parts, assorted, weight 100lb. Suit experimenter, £7 or offer. Will send list. 72 copies "R. & H." continuous Jan. 1941, £2/10/-. **17 Beaver-st., Essendon, Melb.**

SALE: A.W.A. Batt. Op. Oscillator, £10. Comp. set No. 11 Power Supp., £2/10/-. **C. W. Everdell, Gleneage, Beaudesert Line, Qld.**

SALE: Triplet Valve Tester, old type. Will test most types of valves. Price £6/-/-. **21 Prospect-st., Erskineville.**

SELL: 10 volumes Amer. Tech. Soc. Applied Elec. 1944. Excellent condition. Cost £17. Sell £9. **H. R. Green, 10 McLean-st., Auburn, N.S.W.**

SELL: Five-valve portable ("R. & H." circuit) without case. Plug-in batteries. New. £15 or offer. **C. Miller, Branch University, Mildura, Vic.**

SELL: 1-6770 A.W.A. Communication Receiver in 200 K.C. to 30 M.C. 240v. A.C. Brand new, cheap. Apply **723 Anzac-parade, Maroubra.**

SELL: 10 henry 500 M.A. chokes, 3 at 15/- each. 6 mfd. 1000v. cond. 15/- each. 4mfd. 1500 VW cond. 10/- each and various other parts for sale. **170 Dunning-ave., Rosebery.**

SELL: 2-valve set 1Q5GT with cabinet, batts., speaker, also one Reinartz coil, one 1D8-GT, one 5Y3-GT, one 6V6-GT, £10. **FA8408, Flat 4, 8 Waratah-st., Rushcutters Bay.**

SELL: 3 gang Condenser, 1 new (G), 2 as new. Philips D/W Coils, 2 each Aer. R.F. Osc., 4 I.F's. (all factory checked), Wave Change Switch (new), 5" Speaker (1500 field) and Transformer, 2 Philips Chassis (new), 1. 6B7. £4 on rail. **R. Griffith, Box 8, Tenterfield.**

Readers wishing to buy, sell or exchange goods are invited to insert an advertisement on this page. The cost is 9d per line; minimum charge 2/3. Approximately 6 words to a line. Advertisements for the next issue must reach our office by WEDNESDAY, NOVEMBER 5, Dealers' advertisements not accepted.

SELL: New, unused 813 and socket or exchange. Best offer. Write **T. Clarke, Chetwynd East, Vic.**

SELL: 1946 edition "Applied Electricity." 8 books as new. Cost £17/10-. Sell £12/10/-. Pay freight. **Lambert, 5 Aberdeen-st., Hawthorn, E.3, Victoria.**

SELL: All "Radio & Hobbies" August, 1939, to March 1947. Also "Radio Worlds," January to Nov., 1941. What offers. **E. Harvey, 71 Stanley-st., Townsville.**

SELL: Small 3-gang condenser, 3¼x2⅜x2¼ (blades open), perfect order, also 2-gang ceramic mounted Hammerlund, about 100 or 150 mm.f. Apply **Mansbridge, P.O., Tewantin.**

SELL: 1-valve set, just made, good reception. With batts. and high quality phones. In small cabinet. £5. **D. Bond, 191 Nepean-rd., Seaford, Vic.**

SELL: Kodak B. 620 folding camera, 6.3 lens, leather carrying case, cable release, and Wratten K2 filter, as new, £8/10/-, or best offer. Further particulars from **M. Clarke, 21 Charlotte-st., Toowoomba.**

SELL: 1 M50 Ferguson's Modulation & former (variable tappings) new, never been used, £2/10/-. Also 1 portable 4-valve kit set, £10/-/-. **Gale Bros., Fish Creek, Sth. Gippsland, Vic.**

SELL: 51 copies "R. & H.," 1941 to 1946. Offers? **G. Simpson, 40 Darling-st., Tamworth.**

SELL: 8in. dynamic spkr., 2500 fld., 7000 load; plus cord & plug. £1, plus postage. **D. Cannell, Gretna, Tas.**

WANTED: Urgently, April, 1944 "R. & H." Quote price. **P. Lamb, The Knoll, Railway-pde., Leura, N.S.W.**

WANTED: "R. & H." in good order, Vol. 2, No. 9; Vol. 3: No. 1, 8, 9; Vol. 4: No. 1, 3, 4; Vol. 5. No. 5. Pay reasonable price, to **E. J. Pearce, Holgate, Gosford.**

WANTED: Power Supply Genemotor, and cables, for Marconi 1154-5. **I. Fitzpatrick, University Branch, Mildura, Victoria.**

WANTED: Cigarette cards wanted. Pay 2/- complete set 50, 1/6 50 part sets. Clean. **V. Nethway, Box 36, Burra, S. Aus.**

WANTED: Folding camera, in good order, price and particulars to **B. O'Keefe, Winslow, Via Wannambool, Vic.**

EXCHANGE: Good camera for small lathe, drill or motor. Write **15 Hopetoun-st., Hurlstone Park.**

SELL: Valves, 6K7G, 6H6 and others, 10/- each. Relays from 5/6. Coaxial Connectors, Ceramic Sockets, cheap. **20 Lawley-crescent, Mt. Lawley, W.A. U1413.**

FOR SALE: 1K5-G 4-valve port. comp. with 5" Rola permag. spk. in att. cab., £20/7/6. Little Jim, 1-valve 1J6-G comp. in cab., £7/7/-. 1Q5-GT, 1-valve comp. in cab., £6/5/6. V625 2valve comp., £12/6/-. **Hay, 25 Wentworth-st., Parramatta, N.S.W. UW9877, week-end only.**

WANTED: "R. & H.," Vol. 1, No. 2; Vol. 7, Nos. 2, 3 & 4. Sell or exchange: Vol. 2, Nos. 1 to 5. Vol 6, No. 6; Vol. 7, No. 8; Vol. 9, No. 4. **Hunt, 6 Hicks-st., Bellambi, NSW.**

## ANSWERS TO CORRESPONDENTS

**P.E. (Gardenvale, Vic.)** asks whether "Monty" can be used with a loud-speaker in place of the headphones.

A.: You cannot expect much from this little set on a loud-speaker, since it is, after all, a very simple type of circuit. You can adjust the high tension voltage to a maximum of 150 on the triode plate. Under these conditions, very limited power will be available.

**L.F. (Maryborough, Vic.)** sends in his subscription and suggests an article on cord drive dials.

A.: Many thanks for your letter, but we doubt whether an article on this subject would be practicable. There are so many varieties of dials in use in this country that a vast amount of investigation and draughting work would be necessary to illustrate them all. Your 160-volt power transformer would be quite OK for the modulated oscillator. We do not know as yet just how we may be affected by newsprint restrictions.

**K.R. (Mannum, SA)** asks us to publish more articles on flying model planes, similar to a couple of articles some months back.

A.: Many thanks for your letter, K.R. The chief interest of our magazine is radio, of course, and our problem at the moment is to find enough space for articles on workshop and model aeroplane interest.

**W.S. (St. Kilda, Vic.)** reports having built the "Little Jim's Mate" receiver but has not been able to make the reaction work properly.

A.: The fact that the reaction condenser has an effect on volume but does not actually promote oscillation would indicate that it is correctly connected. Make sure that your valve is a good one, that the operating voltages are right up to the mark and that the grid resistor is of the marked value. If all these things are in order, the chances are that the coil has not sufficient reaction turns. Try another brand of coil or try connecting a 50 or 100 mfd. condenser in parallel with the reaction condenser to see whether matters are improved. Our new handbook will contain articles of special amateur interest along the lines you suggest.

**F.H. (Regent West, Vic.)** writes in appreciation of "Radio and Hobbies," and suggests that we should give voltages at various points in our circuits for test purposes.

A.: Thanks for your letter, and we have attended to the advertisement for you. We have stated test voltages for some of our circuits but have missed out on others. One important point, of course, is that the readings obtained at many points in a circuit depend on the internal resistance of the measuring voltmeter.

**G.F.L. (Warwick, Qld.)** says he likes reading "Radio and Hobbies" but finds that the cost of radio parts is rather high.

A.: We agree that the cost of some parts is on the high side but there is little we can do about it, as you say. We trust that you will continue to derive much pleasure from reading the magazine.

**D.K. (Llandilo, NSW)** sends in his subscription to "R. and H." and inquires about the load impedance for the 1Q5-GT valve.

A.: Your subscription has been duly attended to by our subscriptions department. The correct load impedance for the 1Q5-GT is 8000 ohms. We are pleased to note your interest in "R. and H.," particularly the "Fireside Five" receiver.


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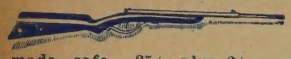


"Cracajac" Air Rifle. Possesses tremendous power and accurate sighting. Strongly made—safe. 35/- plus 2/- postage. Slugs supplied only with gun. 300 per gun, 1/6 extra.

Hand, carbon microphones. Give splendid reproduction. Fine offer 7/6. Complete with transformer, battery, jack-lead. 24/-. 25/6 posted.

Box of Four English JEWELLERS' SCREW DRIVERS. Assorted sizes. Special Wooden Box, 9/8 or 10/3 posted.

English Microphones, carbon single button type.

Just hook up to the pick-up terminal of your radio. Great fun for parties, etc. Complete with battery cable, 20/-.

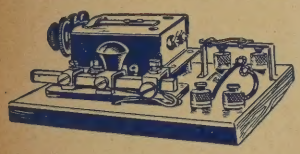
Add postage.

"WAKOUWA"
The world's greatest novelty. It's a scream! It's a wonder! Great fun for young and old. Just press the base and he will perform. 7/9 or 8/3 posted.

Magnetic "LOVE PUPS," Screamingly Funny Little Novelties. Fun. And what Fun. They do the most unusual, unheard things, 3/6 or 4/- posted. The pair could fit in a Safety Match Box.

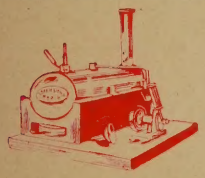
STROMBERG-CARLSON, 2000 ohms. Wonderful Value at 21/-. These phones are brand new!! Add 1/6 postage.

NOVELTY WATER PISTOLS
Simple action 3/3 or 3/9 packed and posted.



Army Morse Code Sets. Beautifully made, 10/6, add 2/6 postage. With low ohmage Headphones. Complete for 20/6, plus postage. Btys. 5/- ex.

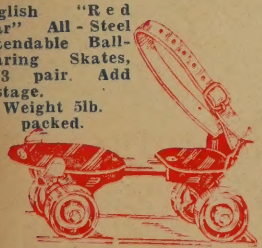
Extra powerful Ainico Magnets. Strongest Made. Size 7 9/16 x 7/8 x ½in. thick, 2/- each, or 3/6 pair. Add 3d and 6d postage.

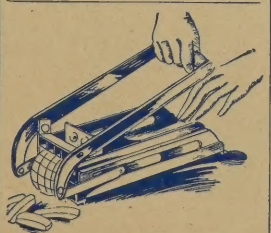


"Dikta" Donkey Engine, brass piston and boiler, beautifully made. Ideal for working models, etc. Absolutely safe for children. Complete with whistle, funnel, etc. 39/6. Add 1/6 postage.

"Durable" English Unbreakable Black Enamelled High Grade Fountain Pens. Inoxydable Nib, pocket clip. Push bottom filler. 25/-. 25/6 posted.

English "Red Star" All-Steel Extendable Ball-bearing Skates, 38/3 pair. Add postage.
Weight 5lb. packed.

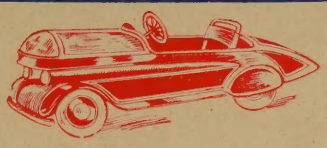




All Metal British "Villa" Potato Chipper, 14/3. Posted and packed 1/6 extra. Easy, Strong, Safe. One Stroke makes 2 dozen Chips.

English miniature crystal sets—fitted with "Perikon" crystal detector. Approx. average range 10-15 metres. Tuning range, 200-500 metres. 24/6. Add 1/- postage.

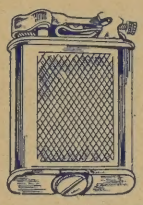
Tumbling Block and Coin Trick Amuses, amazes and mystifies. Anyone can do it. 3/7, or 4/- posted.



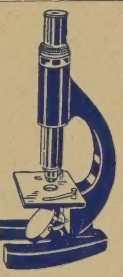
The "Lucas" pedal car as supplied to H.R.H. Prince William of Gloucester, solidly made, 3 speed pedals and adjustable seat. 48" x 19" x 12". Remarkable value at £11/15/-. Add freight. Weight crated approx. 77lb.

Plated Metal cased Tobacco Case and Cigarette Maker. Complete. Very Simple. 7/6. Or 8/3 posted. Shut to Make Cigarette.

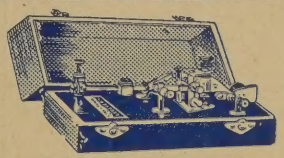
"Colibri" — just arrived from England—single action automatic — you will be proud to own one. 39/6 or 40/- posted.



SPECIAL OFFER English Polo Lighter — swift action. Beautifully finished. Usual retail price 15/-. NOW 9/6 10/- posted.



English Microscopes. Beautifully made, just the thing for budding young scientists. Magnification 100. Complete with slides, tweezers, etc., in polished, lock-up Cabinet. £5/5/-. Add 2/6 postage.



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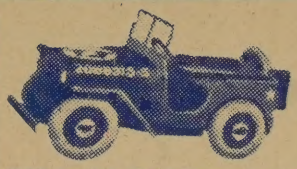
"Penguin" English Mechanical Plastic Racing Car, Possesses a rubber power drive, nothing to go wrong. 4/8 or 5/2 posted.

Also English Scale Model Racing Cars—"Alta," "E.R.A.," and "Maserati." Beautifully made with suspension springing, 17/3 or 17/9 posted.

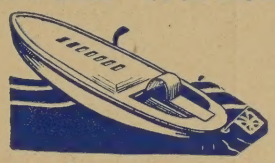
English Parker Flints—long, hard. 2/9 per doz. posted.



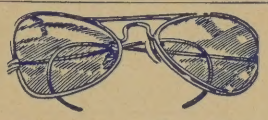
JEEP English Pedal Car scale model Complete with headlights, water carrier, spare wheel, etc. Size, 16" x 20" x 36". £14/12/6. Add freight. Weight crated approx 75lb.

"Wizard" Pedal Car. 43" x 18" x 13" solidly made, well finished, £6/16/6. Add freight. Weight approx. 35lb.

"Silver Streak." It's Jet Propelled.



Made of light alloy, nothing to go wrong. 10" long. 13/9 or 14/3 posted.



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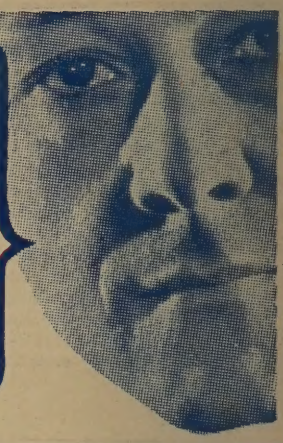
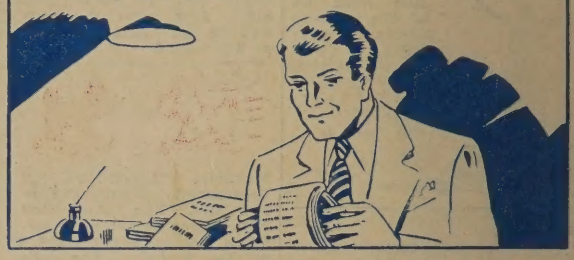


*"Tired of my dead-end job, I wrote to the Australian Radio College for their free book "Careers in Radio and Television."*

*"The book told of excellent opportunities in radio and I decided to enrol immediately. Lessons came promptly and were informative and easy to follow."*



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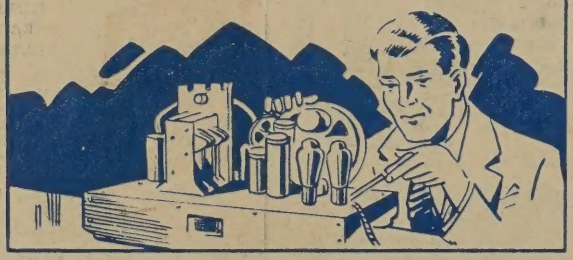

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